

Before the
Federal Communications Commission
Washington, D.C. 20554

GEN Docket No. 87-389

In the Matter of

Revision of Part 15 of the rules	RM-5193
regarding the operation of radio	RM-5250
frequency devices without an	RM-5575
individual license	

NOTICE OF PROPOSED RULE MAKING

Adopted: September 17, 1987; Released: October 2, 1987

By the Commission:

INTRODUCTION

1. By this action, the Commission proposes to amend Part 15 of its rules regarding the non-licensed operation of radio frequency (RF) devices. The objective of this proposal is to promote more effective use of the spectrum while providing additional technical and operational flexibility in the design, manufacture and use of such devices. We propose to achieve such an objective by: 1) allowing manufacturers to produce non-licensed equipment for use on almost any frequency with minimal restrictions on usage, bandwidth, modulation technique and other technical parameters; 2) establishing uniformity between the technical standards for various non-licensed operations; 3) retaining, to the greatest extent possible, operations currently allowed under the rules; and, 4) clarifying and simplifying our administrative requirements. This proposal also addresses several petitions for rule making before the Commission.¹

BACKGROUND

2. The rules for non-licensed use of RF devices were established nearly fifty years ago. In 1938, the Commission allowed devices employing relatively low level RF signals to be operated without the need for individual licensing as long as their operation caused no harmful interference to licensed services and the device did not generate emissions or field strength levels greater than a specified level.² Typical kinds of equipment operated under these regulations were wireless record players, carrier current communication systems, and remote control devices.

3. At the time this standard was adopted, most Part 15 RF devices were designed to operate in the MF (300 kHz-3 MHz) and HF (3-30 MHz) frequency bands and compliance was relatively easy to achieve. However, as the industry designed products intended for operation on higher frequencies, it became more difficult to meet the field strength limits specified in the regulations since the allowable field strength level decreased as the operating frequency increased. Accordingly, over the years the Commission amended and expanded Part 15 of the rules to

permit the non-licensed operation of devices at higher frequencies in those cases where it could be determined that the mass-marketing of such products would not result in harmful interference to authorized services. In the 1950's, the Commission adopted new technical standards for devices such as radio receivers and low power transmitters operating in the 27 MHz band and above 70 MHz. In the 1960's through the 1980's, provisions were made under Part 15 to permit the operation of additional equipment such as wireless microphones, telemetry systems, garage door openers, TV interface devices (e.g., video cassette recorders), field disturbance sensors (e.g., anti-pilferage systems for retail stores), auditory assistance devices, control and security alarm apparatus, and cordless telephones.

DISCUSSION

4. The provisions for new devices generally were adopted in response to petitions for rule making that requested authorization only for the specific device in question. This incremental method of adopting device-specific regulations has resulted in rules that are lengthy and difficult for the public to understand. It has resulted in the adoption of standards that are overly complex and, in some cases, overly restrictive. There are also a number of apparent inconsistencies in the technical standards between Part 15 devices that have similar interference potentials. Early standards adopted to control interference are frequently significantly different than what is needed at the present time due to improvements in equipment, such as receiver sensitivity, the increased proliferation of both licensed and non-licensed operations, and changes to the frequency allocations of authorized radio services.

5. The Part 15 regulatory plan proposed herein is designed to restore the technical flexibility originally envisioned for the operation of non-licensed devices. We believe that the proposals strike an equitable balance in providing for the needs of the general public for non-licensed radio operations and in maintaining the non-interference status of all such operations.

6. In developing these proposals, we have attempted to eliminate, to the greatest extent possible, all unnecessary and overly restrictive technical regulations. Nevertheless, in some instances the decision to permit greater flexibility in the choice of bandwidth and emission type has required the proposed standards to be more restrictive than the present Part 15 standards. In the vast majority of cases, these more restrictive standards are required in order to prevent the possibility of interference to authorized radio services.³ In a few instances, however, we have taken this opportunity to propose more restrictive standards in order to reduce interference to authorized radio services, such as the AM broadcasting service.⁴ We believe that this rule making affords an appropriate opportunity to begin the process of reducing unwanted and unnecessary emissions in the radio spectrum. In making such proposals, however, it is not our intention to propose any regulations that will cause unnecessary or unreasonable economic hardship to manufacturers of Part 15 devices. Accordingly, whenever a more restrictive requirement is imposed, we also provide a substantial "grandfather" period for the continued manufacture of existing devices.⁵

DEVICES SUBJECT TO PART 15

7. In general, Part 15 presently defines and regulates the emissions from "restricted radiation devices." ⁶ Section 15.4(d) defines a restricted radiation device as follows:

A device in which the generation of radio frequency energy is intentionally incorporated into the design and in which the radio frequency energy is conducted along wires or is radiated . . .

In addition, several specific types of restricted radiation devices are defined in the rules. For example, Section 15.4(f) defines a low power communication device; Section 15.4(j) defines a field disturbance sensor; Section 15.4(k) defines a biomedical telemetry device; and, Section 15.4(l) defines an auditory assistance device. ⁷ A computing device is considered a restricted radiation device under Part 15 if it generates and uses timing signals or pulses at a rate in excess of 10,000 pulses (cycles) per second. ⁸ Radio receivers also are regulated under Part 15 "insofar as they are restricted radiation devices . . . or are designed to receive television pictures broadcast simultaneously with sound." ⁹ Accordingly, both devices that intentionally radiate radio frequency energy (e.g., transmitters) and that unintentionally radiate radio frequency energy (e.g., receivers and computers) are regulated as restricted radiation devices under Part 15 of the rules.

8. In order to simplify the technical requirements and to avoid confusion between the various types of devices, we are proposing to delete the definition of a restricted radiation device. In its place, we are proposing to recognize the following two basic types of devices operated under Part 15:

- *Intentional radiators.* These are devices that intentionally generate and transmit radio frequency energy over the air. Examples are walkie-talkies, garage door opener controls, security alarm devices, cordless telephones, etc.
- *Unintentional radiators.* These are devices that generate radio frequency energy but not for communication purposes over the air. These devices usually exchange RF signals by wires or cables, or detect and process over-the-air RF signals that they receive from an antenna. Typical devices are receivers, computers, TV interface devices, non-radiating carrier current systems, etc.

GENERAL TECHNICAL STANDARDS

9. The operation of radio frequency equipment used by authorized services can be disrupted if that equipment receives undesired emissions (harmful interference) from Part 15 devices. The unwanted emissions from a Part 15 device may be radiated over the air or conducted through the power line. ¹⁰ In this item, we are proposing general technical standards for Part 15 devices that we believe are sufficient to prevent harmful interference to authorized radio services. The proposed technical standards set forth general limits for conducted and radiated emissions. These limits apply to both intentional and unintentional radiators. In addition, the technical standards set forth specific frequency bands where higher emission limits are permitted for the operation of intentional radiators. Finally, the

technical standards prohibit operation by intentional radiators on certain safety or sensitive frequencies and frequency bands. The technical standards are described in detail below:

A. General Conducted Emission Limits.

10. Presently, the rules contained in Part 15 concerning conducted emissions specify a number of different limits for various devices. The rules also specify different frequency ranges over which these limits are to be measured. For example, Section 15.63 of the rules specifies a limit of 100 uV over a frequency range of 450 kHz to 25 MHz for TV broadcast receivers while Sections 15.612 and 15.832 specify a value of 250 uV over a frequency range of 450 kHz to 30 MHz for TV interface devices and personal computers. No conducted limit is specified for certain Part 15 devices. For example, FM wireless microphones were not envisioned to need to connect to the power lines, and other devices, such as auditory assistance transmitters, were expected to be used in such limited quantities that a conducted limit was deemed unnecessary.

11. By removing the device-specific regulations, we would no longer be in a position to determine those devices that could be used in such limited quantities as to negate the need for conducted limits. Also, the current widespread application of digital processing techniques has resulted in increases in conducted emissions from devices for which conducted limits were previously deemed unnecessary. Therefore, in this item we are proposing to apply a limit of 250 uV within the frequency range of 450 kHz to 30 MHz to all intentional and unintentional radiators. While this requirement is less stringent than the limits applied to some Part 15 devices, such as TV broadcast receivers and cordless telephones, our experience with personal computers, wireless home security systems, TV interface devices, and other widely used consumer devices leads us to believe that such a limit is sufficient to protect against most cases of interference. We invite comments on the need to impose conducted limits below 450 kHz and above 30 MHz and the standards that should be applied. Three exceptions to this general conducted limit are proposed.

- The current conducted limits would continue to be applied to Class A digital equipment, i.e., digital equipment designed exclusively for industrial, commercial, and business applications. These limits are 1000 uV on frequencies between 450 kHz and 1600 kHz and 3000 uV on frequencies between 1600 kHz and 30 MHz. ¹¹ Since the limits for Class A digital equipment were adopted in 1979, experience has shown that this equipment has not been a major source of harmful interference. This is due, in part, to the lower proliferation of these devices and to their operation in non-residential environments. Comments are requested on the suitability of adopting the Class A digital equipment conducted limits for any Part 15 devices used exclusively in industrial, commercial, or business applications.

- No conducted limit is proposed for carrier current systems, both non-radiating and radiating, whose emissions are contained within the frequency range of 450 kHz to 30 MHz. Instead, such systems would be required to comply with limits on their radiated emissions.

- It is proposed that receivers, excluding TV broadcast receivers and CB receivers, that are manufactured or imported prior to June 1, 1997, be permitted to continue to meet existing Part 15 conducted emission standards.

In addition to the above specific exemptions, comments are requested concerning any grandfather period that should be permitted for those Part 15 devices for which no conducted limit currently applies.

B. Radiated Emission Limits, Intentional Radiators

12. We are proposing in this Notice to give manufacturers considerable flexibility in the design of Part 15 devices. In particular, we are proposing to permit Part 15 intentional radiators to be operated without restriction as to bandwidth, duty cycle, modulation technique or application. We are also proposing to permit the operation of intentional radiators on almost any frequency. To accomplish this objective, a number of general radiated emission requirements are proposed. First, we propose that all intentional radiators be required to meet certain general field strength limits for each designated frequency band from 9 kHz to above 960 MHz. Second, designated operating frequencies are proposed on which field strengths levels higher than the general limits would be permitted. Third, some spurious emission limits are proposed to be tightened for certain frequency bands. Finally, we propose to prohibit the operation of intentional radiators on certain safety and other sensitive radio frequencies.

13. *General Field Strength Limits.* We are proposing to permit Part 15 devices to be operated on almost any frequency without restrictions as to bandwidth, duty cycle, modulation techniques or application as long as the equipment complies with the following general emission limits:¹²

Frequency Band (MHz)	Field Strength (uV/m)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

The above field strength limits are the same as currently applied to Part 15 devices operated below 1.705 MHz. Between 1.705 and 30 MHz, the limits are based on our experience as to the level of emission that could be permitted without undue risk of interference to the authorized radio services. Between 30 and 960 MHz, the limits are the same as for Class B (residential use) computing devices. The level above 960 MHz corresponds to the level recommended by the National Telecommunications and Information Administration through earlier Commission coordination with the Interdepartment Radio Advisory Committee (IRAC).¹³

14. *Operating Frequencies.* The present rules provide exceptions to the general limits in a number of frequency bands for the operation of Part 15 transmitting devices at field strengths greater than the general limits. To the greatest extent possible, this proposal retains those exceptions. In addition, whenever possible, existing operating restrictions have been deleted. For example, this proposal deletes the bandwidth and channelization requirements in

the 27 MHz and 49 MHz bands and deletes the requirement to use a microphone input for transmitters in the 88-108 MHz band. Device-specific regulations are retained only in those cases where such restrictions are the major interference controlling factor.

15. In addition to retaining existing operating frequencies, we also propose to permit Part 15 devices to operate in a number of new frequency bands. Operation within these bands would not entail restrictions on channelization, bandwidth or type of operation. These frequency bands are as follows: 13.553-13.567 MHz, 26.96-27.28 MHz, 40.66-40.70 MHz, 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz. We believe that the establishment of such bands will enable manufacturers to introduce new equipment or to take advantage of new technologies without the need for Commission rule making. We expect this proposal to foster entire new categories of Part 15 devices and to provide major benefits to both manufacturers and consumers.

16. The Commission has received numerous requests, both formal and informal, to allow the non-licensed operation of low power video transmitters on the television broadcast frequencies. We believe that it would not be desirable at this time to permit such video operations. In residential areas, an individual could receive interfering or unwanted video signals from the operation of a nearby non-licensed transmitter. However, video transmissions are feasible in four of the new frequency bands discussed above; operation within these frequency bands should not cause interference to licensed TV stations. Comments on this regulatory approach are requested.

17. *Spurious Emissions.* In most cases, the proposed limits on spurious emissions from intentional radiators are the same as permitted under the present regulations or are identical to the general field strength limits shown above. In some cases, the application of the general field strength limits would result in a tightening of the spurious emission standards. This is particularly true for equipment operated in the 27 MHz and 49 MHz bands. This action is considered necessary since we are proposing to eliminate the bandwidth limitations within these frequency bands. This action would permit the use of emissions that could have a higher interference potential. In addition, it must be recognized that spurious emissions are not required in order for the equipment to function. These emissions contribute nothing to the transmission of information. Rather, spurious emissions reduce the availability of spectrum for other users. Reducing these emissions would provide greater protection for FM and TV reception as well as for aeronautical purposes and other safety services that use the spectrum. To reduce the impact of these changes on the equipment manufacturers, we propose to grandfather existing equipment until June 1, 1997. Comments are requested on the appropriateness of the proposed grandfather period and whether there are additional intentional radiators for which grandfather provisions should be provided.

18. *Restricted Bands.* In order to provide additional interference protection to certain sensitive radio services, we are proposing to prohibit operation on the frequencies used by these radio services, permitting only spurious emissions at or below the general field strength limits to fall within these bands. These bands include those frequencies allocated to safety-of-life or to services which utilize very low received signal levels, such as radio astronomy or satellite down links.¹⁴ We have coordinated

this proposal with the Interdepartment Radio Advisory Committee of the National Telecommunications and Information Administration (NTIA).¹⁵ They have indicated that it is preferable to keep Part 15 devices out of a large number of the U. S. Government frequency bands. While we have not proposed all of the bands requested by the IRAC for restricted status, we believe that we have designated all of the bands for which such protection is warranted. The proposed restricted bands are as follows:

MHz	MHz	MHz	GHz
0.49-0.51	164.43-164.72	2483.5-2500	9.3-9.5
2.1735-2.1905	166.73-167.17	2655-2900	10.6-12.7
8.362-8.366	240-285	3260-3267	13.25-13.4
13.36-13.41	322-335.4	3332-3339	14.47-14.5
25.5-25.67	399.9-410	3345.8-3358	15.35-16.2
37.5-38.25	608-614	3600-4400	17.7-21.4
73-75.4	960-1240	4500-525	22.01-23.12
108-121.94	1300-1427	5350-5460	23.6-24.0
123-123.2	1530-1626.5	7250-7750	31.2-31.8
123.58-138	1660-1710	8025-8500	36.43-36.5
149.9-150.05	2200-2300	9000-9200	above 38.6
156.7			

19. We recognize that some intentional radiators, such as swept frequency field disturbance sensors in the 2 to 30 MHz range and anti-pilferage devices, currently operate within these restricted frequency bands. However, we are unaware of any interference problems that have been caused by the existing devices. This may be due to any number of factors including the small number of some devices; the fact that, as a general matter, these devices are operated within commercial buildings whose structure tends to act as a shield to radio signals; or, the short period of time that emissions from these devices occupy the restricted frequencies. A major reason that interference problems have not occurred is the low field strength limits currently permitted within these restricted bands.

20. Under the current regulations, Part 15 devices generally operate within specified frequency ranges that, to a large extent, avoid the restricted frequency bands. Since this Notice is proposing to allow unrestricted operation on most frequencies and increases the field strength limits for many devices, we believe that there is a need to designate restricted frequency bands for all Part 15 intentional radiators. However, it appears that the proposed general field strength limits below 70 MHz may be sufficiently low to reduce the probability that interference would result to the authorized radio services, negating the need for restricted bands below 70 MHz.

21. For example, this Notice proposes to allow control and security alarm devices and other periodic transmitters to continue to operate at their higher field strength limits at frequencies above 70 MHz without designating specific operating frequency bands. Also, this Notice proposes to continue to allow the higher harmonic emissions for some devices operating above 70 MHz, such as field disturbance sensors, auditory assistance devices and spread spectrum transmitters. However, we are concerned about the potential for these devices to cause interference to the sensitive authorized radio services located within the restricted bands and believe that the restricted bands above 70 MHz should be retained for this reason.

22. Comments are requested on the suitability of the restricted bands proposed in this Notice. Should the Commission apply these restricted bands to all intentional ra-

diators with a grandfather period similar to that proposed for receivers and intentional radiators in the 27 MHz and 49 MHz bands? Are additional restricted bands needed? Should the Commission delete the restricted bands designated below 70 MHz? Should the concept of restricted bands be applied only for devices operating above 70 MHz? Do restricted bands need to be designated for intentional radiators operating under the general field strength limits? Should some provision be established to permit operation in these restricted bands without the need for additional rule making, following coordination with both the FCC and the NTIA? What additional technical and operating conditions should be applied to equipment permitted under this coordination procedure?

23. *Impact.* We believe that the above proposed changes to the regulations should provide major benefits to the manufacturers of Part 15 devices and further serve the public interest by enabling new technologies and new equipment categories that satisfy consumer demands to be introduced without the need for Commission rule making. Operation on almost any frequency would be permitted under the general field strength limits, and operation at higher field strength limits would be permitted in the new designated higher field strength bands.

24. We further believe that any increased manufacturing costs which result from the proposed additional attenuation of spurious emissions and the application of restricted bands will serve the public interest by reducing the interference potential of Part 15 devices to licensed radio services. While operation under the general limits will permit the operation of Part 15 devices on frequencies that were not formerly available, the relatively low field strength limits being proposed should not increase the potential for interference substantially. The new frequency bands proposed in this Notice are now allocated primarily for Industrial, Scientific and Medical (ISM) operations under Part 18 of the Commission's rules. ISM devices are a source of interference but normally are not susceptible to receiving interference from other sources. These new bands also are allocated to other users of the spectrum on a secondary basis. For example, the Amateur Radio Service (Part 97) is permitted within the frequency bands 902-928 MHz, 2400-2450 MHz, 5725-5875 MHz and 24.0-24.25 GHz; automatic vehicle monitoring systems under the Land Mobile Radio Service (Part 90) are permitted in the frequency bands 903-912 MHz and 918-927 MHz; the Citizens Band Radio Service (Part 95) is permitted in the frequency band of 26.96-27.28 MHz; and, U. S. Government operations are permitted in the frequency bands 13.553-13.567 MHz, 40.66-40.70 MHz, 902-928 MHz, 2400-2450 MHz, 5725-5850 MHz, and 24.0-24.25 GHz.

C. Radiated Emission Limits, Unintentional Radiators

25. In the case of unintentional radiators, such as receivers or computing devices, the emission of radio frequency energy is not a prerequisite for proper operation. Inasmuch as the emission of radio frequency energy serves to pollute the radio spectrum, its reduction is beneficial to other users.¹⁶ Nevertheless, we recognize that the suppression of radio frequency emissions usually entails significant costs in the design and manufacture of such devices. Therefore, we have attempted to propose standards that appear to be well within the capability of the current state-of-the-art in radio frequency design technology and, through our experience with computing devices designed

for residential operation, appear to be sufficient to protect authorized radio services from harmful interference. The limits proposed for unintentional radiators are as follows:

Frequency Band (MHz)	Field Strength (uV/m)	Measurement Distance ¹⁷ (meters)
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Two exceptions to the general field strength limits are proposed:

- Class A digital equipment may continue to meet the present standards for the same reasons given above in the case of conducted limits.
- Receivers manufactured or imported prior to June 1, 1997, may continue to comply with the present limits of Section 15.63 of the rules.

26. In addition to the above field strength limits, we propose that receivers without permanently attached antennas be tested for compliance with the antenna terminals connected to a shielded termination and that such receivers be subject to an additional emission power limit at the antenna terminals. This requirement is similar to that now applied to CB receivers¹⁸ and is intended to prevent interference from radio frequency energy emitted from the antenna connected to the receiver. Under the present rules, most receivers are required to be tested with a "standard" antenna connected to the antenna terminals. The use of a "standard" antenna has caused some confusion in the past and has led to inconsistent test results. We believe that the proposed procedure should simplify the testing of receivers and provide better repeatability of the test measurements.

27. Field strength limits above 1000 MHz are proposed for all unintentional radiators in order to account for the higher frequency emissions being produced by these devices. At the same time, field strength limits would apply to CB receivers, receivers that operate within the 30-1000 MHz band, and all other unintentional radiators.¹⁹ The rapidly increasing clock frequencies of digital devices, as well as the increasing popularity of such consumer devices as home satellite receivers²⁰, have led to increases in the types of devices capable of producing unwanted emissions above 1000 MHz. So as to reduce the probability that interference could be caused to the authorized radio services above 1000 MHz, we propose the establishment of higher frequency field strength limits and the inclusion of higher frequency receivers under the regulations. Comments are requested as to the appropriateness of the frequency range proposed for receivers. Should the frequency range be expanded to a higher frequency, such as 1215 MHz?

28. We recognize that higher field strength limits could be permitted for certain types of emissions without increasing the potential for interference. For example, the proposed limits may impose unnecessary costs if they were applied to some of the emissions from superheterodyne receivers, such as TV broadcast receivers. Superheterodyne receivers generally produce narrow band emissions corresponding to the oscillator frequency and its harmonics. However, these receivers also emit signals on

the intermediate frequencies and on the frequencies of received subcarriers. The narrowband emissions from the receiver oscillator are not as prone to causing interference problems. Thus, comments are requested as to whether the Commission could permit higher signal limits on the oscillator frequency. If so, what should those limits be? Should this relaxation apply only to the specific oscillator frequency or should it also apply to the harmonics of that oscillator?

29. The Commission is aware that the proposals contained within this item for unintentional radiators entail some costs to the manufacturers of this equipment that could be borne by consumers. We request comments as to the magnitude of these costs. We also request comments on the degree to which the proposed grandfather period could offset any impact to the manufacturers of unintentional radiators.

30. The adoption of these proposals for unintentional radiators could affect both the manufacturers of Part 15 unintentional radiators and the users of authorized radio services. The users of authorized radio services should experience a reduction in background noise levels, i.e., a decrease in the level of interference to their operations. A large number of Part 15 unintentional radiator manufacturers, particularly receiver manufacturers, could be required to redesign their equipment in order to comply with these specifications. However, it should be noted that the Commission's recent testing of TV broadcast receivers indicated that some TV receivers already comply with the limits proposed in this Notice. At this juncture, we believe that the 10 year grandfather period would permit equipment manufacturers to comply with the proposed standards as they introduce new designs. This would allow the impact to these manufacturers to be minimized.

D. Measurement Techniques

31. Updated measurement procedures for all intentional and unintentional radiators will be published for public comment soon. These procedures will be based, insofar as practicable, on American National Standards Institute (ANSI) Standards C63.2 and C63.4 as well as on current FCC practices. Our proposed measurement procedures will detail those procedures employed by the Commission to evaluate equipment.

32. *Measurement of Power Line Conducted Emissions.* We are proposing to standardize the measurement of conducted emissions by specifying a standard Line Impedance Stabilization Network (LISN). The present regulations are divided between the use of an old test method based on a 50 Ohm/5 uH LISN and a newer test method based on a 50 Ohm/50 uH LISN. The use of the 50 Ohm/50 uH LISN is in conformance with ANSI Standard C63.4 and the standards recommended by the International Special Committee on Radio Interference (CISPR) and was requested by the computing device industry. The impedance of the 50 Ohm/5 uH LISN falls off rapidly at lower frequencies and is not as effective as the 50 Ohm/50 uH LISN. Therefore, in this revision of Part 15 we are proposing to require the use of the 50 Ohm/50 uH LISN, as described in ANSI Standard C63.4, for all measurements of power line conducted emissions. The 50 Ohm/5 uH LISN may continue to be used for grandfathered receivers.

33. *Detector Functions of Measuring Instruments.* The existing rules in Part 15 express most field strength limits in terms of the average value of the emission. For a pulsed emission, it is necessary to determine this value by calcula-

tion. This process can be time consuming to perform and increases the time for the FCC to review test data or evaluate devices. Also, for very brief pulses, the currently used averaging time of 0.1 second permits peak emissions of very high levels that may increase the interference potential of the device. In addition, the complexity of this test procedure makes it difficult to obtain repeatability of measurement results.

34. With the widespread implementation of digital systems within both intentional and unintentional radiators, the use of emission limits expressed as an average value may not provide a suitable indication of the interference potential of the device under test due to the high peak emissions. However, the use of a CISPR quasi-peak detector, as described in CISPR Publication 16, gives a better indication of the interference potential of a signal since it provides a closer representation of the power density of the radiated signal, accounting for the peak emissions. It also provides a reliable and repeatable method of measurement. In addition, the interference potential of the general emission limits in this proposal was established based on CISPR quasi-peak measurements. For these reasons, we are proposing to employ the use of a CISPR quasi-peak detector for emissions below 1000 MHz. Since the CISPR quasi-peak measurement procedure standard currently applies only to frequencies below 1000 MHz, we are proposing to require peak measurements above 1000 MHz.

35. The use of CISPR quasi-peak measurements could result in a reduction of the permitted signal levels of some devices, particularly those employing pulsed emissions. This may be a reasonable trade-off since the CISPR quasi-peak measurements appear to provide a better indication of the potential of the emission level to cause interference, are easier to perform and provide better repeatability. However, it is realized that such a change in the measurement techniques could significantly impact the users and manufacturers of pulsed modulation devices, particularly garage door opener controls and wireless security alarm systems. For this reason, this Notice proposes to permit intentional radiators operating under the provisions for periodic transmitters above 70 MHz, including control and security alarm devices, to continue to measure their emissions to comply with average limits, except for those emissions occurring within the restricted frequency bands. At the same time, a limit on the peak-to-average ratio, restricting peak emissions to no higher than 20 dB above the maximum average field strength, is proposed to reduce potential interference problems. The use of CISPR quasi-peak measurements is optional for these devices. At the same time, we request comments on the suitability of requiring periodic transmitters, *i.e.*, pulsed modulation devices, to comply with the emission limits when measured in the CISPR quasi-peak and peak modes. Comments are requested on the relationship between peak, CISPR quasi-peak and average emission measurements for these pulsed modulation devices. Based on these relationships, comments also are requested on suitable adjustments to the emission limits that could be applied to control and security alarm devices operating above 70 MHz, allowing the majority of these devices to continue to employ the same operating range as under the present regulations, should the Commission adopt CISPR quasi-peak and peak (above 1000 MHz) emission specifications for these devices.

AUTHORIZATIONS AND APPLICATIONS

A. Equipment Authorization Program.

36. We recognize that this Notice is proposing a number of new frequency bands and standards that would allow for the development of new devices with which this Commission has no prior experience. For this reason, except for placing FM wireless microphones and telemetry transmitters in the 88-108 MHz band under the certification procedure instead of type approval, no changes to the equipment authorization requirements are being proposed. Certification would continue to be applied to all intentional radiators and some unintentional radiators. Other unintentional radiators would continue to be authorized under the notification and verification procedures.

B. Kits.

37. We also are proposing to place RF devices marketed in kit form under our regulations. Measurements demonstrating compliance with the relevant technical standards for verification or an application for Commission authorization shall be performed using assembled representative kits. The lack of technical regulations for mass-marketed kits has resulted in a number of non-authorized devices being offered in kit form. Such devices have a high potential for causing harmful interference to the authorized radio services. By placing kits under our standards, this interference potential could be controlled. Home-built units not constructed from kits that are produced in quantities of five or less and that are not marketed would continue to be verified for compliance by the parties assembling them. For more detail on the authorization program, see the proposed Sections 15.23, 15.25, 15.101, 15.103 and 15.201.

C. Exemptions for Digital and Test Equipment.

38. The Commission has exempted five categories of computing devices from the technical standards in Subpart J of Part 15 of the regulations. These are: 1) computing devices that are utilized in a transportation vehicle; 2) electronic control or power systems used by a public utility or in an industrial plant; 3) industrial, commercial and medical test equipment; 4) computing devices used in appliances; and, 5) specialized medical computing devices. This item proposes to retain these exemptions. In addition, we propose to exempt all digital devices that require a power input of 6 nW or less. This level was chosen based on the power needed to cause radiated emissions to exceed the general field strength limits when radiated over free space from an isotropic antenna. That amount of power was calculated to be 3 nW. The 6 nW figure assumes a 50 percent efficiency of converting supply voltage into radio frequency energy. Further, we propose to exempt the following digital devices: musical greeting cards, quartz watches and clocks, modules of quartz watches and clocks, and battery operated hand-held calculators and electronic games not requiring connection to the AC power lines.

39. The devices newly proposed to be exempted from the technical standards are currently subject to verification to the standards in Subpart J of Part 15 as computing devices before they can be marketed within the U. S. However, these devices generate such low levels of radio frequency emissions that they have virtually no potential for interfering with the authorized radio services. By delet-

ing the technical regulations for low powered digital devices, the Commission would remove a large regulatory burden for a considerable number of consumer devices. Comments also are requested on the feasibility of exempting from the technical standards portable, battery operated personal computers operating below a specified clock rate and power input limit and portable, battery operated peripherals used solely with such computers. Comments are requested on the maximum 1.0 MHz clock rate and 0.1 W power consumption limits proposed in the regulations, qualifying such computers and peripherals as calculators.

D. Importation.

40. Under Part 2, Subpart K of the Rules, the Commission requires the use of FCC Form 740 for each shipment into the United States of radio frequency devices. Based on the reasoning shown in the preceding paragraphs, we propose to discontinue the requirement for FCC Form 740 for all radio frequency devices with a power input to the radio frequency stage of no greater than 6 nW, musical greeting cards, quartz watches and clocks, modules of quartz watches and clocks, and battery powered hand-held calculators and electronic games not requiring connection to the AC power lines.²¹ At the present time, it appears that the relaxation of the importation regulations for devices with a power input to the radio frequency stage of less than 6 nW would affect only digital devices. Comments are requested as to any other devices that may fall within this exemption.

MISCELLANEOUS PROPOSALS

A. TV Interface Devices

41. The limits applied to RF signals that are conducted over the output connecting cable of a TV interface device are proposed for deletion. The interference from a TV interface device is controlled primarily by the radiated limits, the power line conducted limits, and the limit on RF energy to any receiving antenna connection. It does not appear that the RF output signal limits significantly affect the interference potential of the equipment. Therefore, it is believed that the imposition of such a limit places unnecessary restrictions on TV interface devices that may impede design innovations. However, we are concerned that the deletion of the output signal limits could inadvertently permit the authorization of transmitters that exceed the general field strength limits being marketed for operation on the television broadcast frequencies. Comments addressing this concern are requested.

B. Antenna Connections for Intentional Radiators.

42. The present rules require some intentional radiators to be self contained with the antenna permanently attached to the enclosure of the device, and prohibit the use of any antenna other than that furnished by the manufacturer. These requirements apply primarily to 49 MHz transmitters operated under Sections 15.118 or 15.119, 88-108 MHz transmitters operated under Sections 15.162, 15.174, or 15.335, devices that measure the characteristics of a material under Section 15.192, and cordless telephones operated under Section 15.233 of the regulations. Since the antenna characteristics directly affect the field strength of the radio frequency emissions, this regulation was found necessary originally to prevent the use of an-

other antenna that could increase the range of the equipment by increasing the radiated emissions. This regulation has previously been applied only to intentional radiators that are mass marketed for consumer applications or operate on frequencies within the FM broadcast frequency band. However, this item is proposing to delete a number of the current operating restrictions, making operation on most frequencies available for general consumer applications. Since the Commission would no longer be able to base its technical standards on public comments regarding the interference potential of specific devices, more conservative intentional radiator system parameters seem appropriate. For that reason, we are proposing to require that any antenna used with a Part 15 intentional radiator subject to a field strength limit be either permanently attached or use a unique coupler. This action should ensure that only the antenna provided by the manufacturer could be used with the equipment and that the intentional radiator, therefore, would comply with the permitted field strength limits.

C. External Connections for Intentional Radiators.

43. The present regulations do not permit external inputs for some low power transmitters such as cordless telephones and 88-108 MHz wireless microphones. The rationale for this restriction is to limit the usability of the devices, thereby reducing the number of units in the market. Because of the high level of proliferation that already exists for these devices, restrictions on the ability to provide external input signals no longer has any meaningful bearing on the interference potential of the equipment. Thus, we feel that these input limitations could be deleted. This additional flexibility would allow manufacturers to provide features such as cordless telephones with computer modem connections. Manufacturers would be required to provide users with information on the type of accessories that may or may not be utilized to maintain the device in compliance. We request comments on the need to continue to restrict external inputs for some intentional radiators.

D. Special Applications for Intentional Radiators.

44. *Spread Spectrum Systems.* The provisions under the present rules for the use of direct sequence and frequency hopping spread spectrum systems in the 902-908, 2400-2483.5, and 5725-5850 MHz bands are retained in the proposed revision to the regulations without modification except to clarify certain receiver requirements. However, we request comments on the feasibility of changing these standards to reflect a field strength limit, instead of the current transmitter power limit. The use of a field strength limit allows the regulations to be stated in a manner consistent with those applied to other Part 15 devices. It also provides additional control on interference potential. Field strength measurements would be required to demonstrate compliance with the limits in the restricted bands and for spread spectrum operation in any other bands. As no manufacturer to date has obtained authorization for a spread spectrum system, the Commission has no experience with the possible interference impact of permitting spread spectrum systems to operate at the power level stated in the current regulations. Indeed, Section 15.126(c) of the existing regulations states that "... future investigations of the effect of spread spectrum interference to Government operations in the 902-928 MHz band may

require a future decrease in the power limits." The use of a field strength limit specification could avoid future changes by the Commission to the permitted power limits.

45. Although we are proposing to retain the present limits in terms of output power for frequency hopping and direct sequence systems, specific comments are requested on the suitability of the following field strength limits for such spread spectrum intentional radiators. The field strength of any emissions appearing within the specified frequency bands would be limited to 500 millivolts/meter at 3 meters with harmonics limited to 1.6 millivolts/meter at 3 meters. Emissions outside of the specified frequency bands, excluding harmonics, would be required to be attenuated at least 50 dB below the level of the unmodulated carrier or to the general field strength limits, whichever is the lesser attenuation. These limits would be offset by allowances in the measurement procedures. Those allowances would delete the requirement in the proposed Section 15.31(m) for adjusting the measured level of wideband emissions at frequencies below 1000 MHz, would specify a 6 dB measurement bandwidth of 100 kHz for frequencies above 1000 MHz, and, for frequency hopping spread spectrum, would allow the signal to be averaged according to the time that the signal is within a specified hopping channel. The proposed field strength limits and these allowances to the measurement procedures should provide the equivalent of a one watt signal into a dipole antenna.

46. No special provisions or additional standards are being proposed for spread spectrum operations other than frequency hopping and direct sequence systems. However, any form of spread spectrum would be allowed under the general field strength limits or the higher field strength limits permitted in certain frequency bands as proposed in this Notice. We do not have sufficient information at this time as to the interference potential of various spread spectrum operations to permit their widespread use at higher power limits. Because of our proposal to allow general, unrestricted operation on most frequencies, some degree of caution must be exercised to reduce the risk of interference to the authorized radio services.

47. *Specialized Field Disturbance Sensors (Vehicle Radar Systems)*. The regulations proposed in the attached Appendix for field disturbance sensors operating above 900 MHz are identical to those currently contained in Subpart F of Part 15 with the exception that the measurements are performed at a distance of 3 meters. However, it is noted that the Commission has issued a waiver of the field strength limit for the frequency band of 24075-24175 MHz to Vehicle Radar Safety Systems, Inc. (VRSS) to permit the operation of a collision avoidance system, a device used to warn drivers of a possible collision source.²² Under the terms of that waiver, VRSS was permitted to employ a field strength of 750,000 uV/m at 30 meters instead of 250,000 uV/m at 30 meters as required under the regulations. (These limits would be 7,500 mV/m and 2,500 mV/m at 3 meters under this proposed rule making.) We are concerned about the possibility of increasing the potential for interference to the authorized radio services should this field strength limit be raised for all field disturbance sensors. However, we wish to solicit comments as to whether higher field strength limits, such as the limit granted to the VRSS device, should be permitted for field disturbance sensors that are used in specialized operations

requiring additional range, provided the need for that additional range can be demonstrated to the Commission and the likelihood of increased interference is negligible.

48. *Automatic Vehicle Identification Systems*. We propose to delete the special provisions for automatic vehicle identification systems (AVIS) operating in the frequency band of 2.9-4.1 GHz. The Commission has proposed to designate the frequency bands 3.26-3.267, 3.332-3.339, 3.3458-3.358, and 3.4-4.4 GHz as restricted bands in order to protect various satellite down links and radio astronomy operations. Sensitive receivers employed by U. S. Government radiolocation systems in the 2.9-3.6 GHz range raise additional interference concerns should the AVIS be retained at 2.9-4.1 GHz. This change to the regulations should have a minimal impact as it appears that the AVIS is lightly used. We request comments concerning the practicability of retaining AVIS at 2.9-4.1 GHz, its ability to continue to coexist with authorized radio services, and its ability to function in the new frequency bands proposed herein. Those comments should also address the extent to which the AVIS currently is being employed.

INTERFERENCE CONCERNS

49. The proposals advanced above represent our best judgments as to the trade off between beneficial low power spectrum use and possible interference to primary radio services. Nevertheless, we recognize that certain risks may attach to altering our regulations along the lines proposed. The operation of authorized and non-authorized low power devices now accounts for about 10 percent of the interference complaints we receive annually, and this number is growing. The changes proposed herein may foster a greater proliferation of these devices. While greater numbers could result in an increase in the instances of interference, we have taken steps to reduce this effect. The field strength limits proposed for general operation on the frequencies allocated to aviation, public safety, land mobile, television broadcast, and most other frequency bands used by the authorized services are the same as those now applied to residential computer products, and these devices have not appeared to be a major source of interference complaints. In addition, this rule making proposes to establish a number of restricted frequency bands, applicable to all Part 15 intentional radiators, and to decrease the radiated emissions from receivers in order to provide additional protection to the allocated radio services. On balance, we believe that the public interest benefits of the rule changes we propose outweigh the potential for increases in interference. We invite comments on the potential risks of this rule making proposal. We also encourage the submission of any empirical interference data that is available and will help us in evaluating this rule making.

SUMMARY

50. As discussed in the preceding paragraphs and as shown in the appendix, this item proposes to remove most of the device-specific regulations contained in Part 15, deleting many of the restrictions on bandwidth, modulation or application. General field strength limits are proposed to permit the operation of an intentional radiator on any frequency with the exception of the restricted bands. Consumer bands at higher field strength limits also

are proposed. The emission limits for unintentional radiators and for spurious emissions from intentional radiators are proposed to be tightened to the Class B computing device limits below 960 MHz and to 500 $\mu\text{V}/\text{m}$ at 3 meters above 960 MHz. A power line conducted limit of 250 μV over the frequency range of 450 kHz to 30 MHz is proposed for all Part 15 devices except for certain carrier current operations. The frequency range over which receivers would be subject to the regulations is proposed to be expanded to an upper limit of 1000 MHz. Digital devices with a power input of no greater than 6 nW, musical greeting cards, quartz watches and clocks, modules of quartz watches and clocks, and battery powered hand-held calculators and electronic games not requiring connection to the AC power lines would be exempted from the technical standards. Comments are requested on the feasibility of exempting low power, low clock rate portable personal computers and their peripherals from the technical standards. A summary of the changes proposed for intentional and unintentional radiators, comparing the existing and the proposed regulations and showing the radio services allocated to operate within the proposed restricted frequency bands, can be obtained by contacting the Commission's copy contractor, International Transcription Service, Suite 140, 2100 M Street, NW, Washington, DC 20037, (202) 857-3800.

51. This Notice proposes to delete the requirement to file FCC Form 740 for devices with a power input to the radio frequency stage of no greater than 6 nW and other low power digital devices. In addition, the administrative procedures for obtaining a grant of certification would be moved from Part 15 and placed in Subpart J of Part 2 along with the other equipment authorization procedures. Kits are proposed to be placed under the equipment authorization procedures. It is proposed that emissions below 1000 MHz be measured using a CISPR quasi-peak detector, and that emissions above 1000 MHz be measured as peak values. The requirement to obtain a special temporary authorization or an experimental/developmental license when testing equipment for compliance with the regulations outside of a shielded enclosure would be removed.

PROCEDURAL MATTERS

52. Under the procedures set out in Section 1.415 of the Commission's Rules, interested persons may file comments on or before **December 4, 1987** and reply comments on or before **January 4, 1988**. All relevant and timely comments will be considered by the Commission before final action is taken in this proceeding. In reaching its decision, the Commission may take into consideration information and ideas not contained in the comments, provided such information or writing indicating the nature and source of such information is placed in the public file and provided that the fact of the Commission's reliance on such information is noted in the Report and Order.

53. In accordance with the provisions of Section 1.419 of the Commission's Rules, formal participants shall file an original and five (5) copies of their comments and other materials. Participants wishing each Commissioner to have a personal copy of their comments should file an original and 11 copies. Members of the public who wish to express their comments are given the same consideration regardless of the number of copies submitted. All docu-

ments will be available for public inspection during regular business hours in the Commission's Public Reference Room at its headquarters in Washington, D. C.

54. For purposes of this non-restricted notice and comment rule making proceeding, members of the public are advised that *ex parte* contacts are permitted from the time the Commission adopts a notice of proposed rule making until the time that a public notice is issued stating that a substantive disposition of the matter is to be considered at a forthcoming meeting or until a final order disposing of the matter is adopted by the Commission, whichever is earlier. In general, an *ex parte* presentation is any written or oral communication (other than formal written comments/pleadings and formal oral arguments) between a person outside the Commission and a Commissioner or a member of the Commission's staff which addresses the merits of the proceeding. Any person who submits a written *ex parte* presentation must serve a copy of that presentation on the Commission's Secretary for inclusion in the public file. Any person who makes an oral *ex parte* presentation addressing matters not fully covered in any previously-filed written comments for the proceeding must prepare a written summary of that presentation. On the day of oral presentation, that written summary must be served on the Commission's Secretary for inclusion in the public file, with a copy to the Commission official receiving the oral presentation. Each *ex parte* presentation described above must state on its face that the Secretary has been served, and must also state by docket number the proceeding to which it relates. See, generally, Section 1.1231 of the Commission's Rules.

INITIAL REGULATORY FLEXIBILITY ANALYSIS

55. Pursuant to the Regulatory Flexibility Act of 1980, 5 U.S.C. Section 603, the Commission's initial analysis is as follows:

I. Need and purpose of this action:

The regulations pertaining to the operation of a radio frequency device without an individual license were incrementally promulgated over the last 35 years resulting in device-specific regulations, inequities in technical standards between devices with similar interference potentials, standards that may be too strict or that have become too lax, and regulations that appear to be confusing to the general public. The existing regulations also prohibit a number of radio frequency operations that could be permitted without unduly increasing the potential for interference to the authorized radio services. This item reviews all of the standards applicable to Part 15 devices.

II. The objectives:

The Commission is proposing major revisions to most of the technical standards in Part 15 of the regulations. The primary objective is to provide the public and industry with additional flexibility in using radio frequency energy for consumer oriented applications. To accomplish this, this revision will permit unrestricted operation on most frequencies except for a limit on the field strength of the radiated emissions. The proposed regulations are consistent, applying operating standards equally to devices in accordance with their potential for causing interference. These standards take into account the needs for interference protection based on current equipment designs instead of being based on an interference analysis that is

over 30 years old when many of the original Part 15 standards were adopted. Unnecessary regulations have been proposed for deletion.

III. Legal basis:

The actions proposed herein are taken pursuant to the authority contained in Sections 4(i), 301, 302, 303 and 307 of the Communications Act of 1934, as amended.

IV. Description, potential impact and number of small entities affected:

Most of the actions proposed in this proceeding will have a beneficial economic impact on small entities. By providing the regulatory flexibility needed to permit general use, consumer frequency bands, this action should foster an effective competitive marketplace in the area of low power telecommunications. The deletion of many technical restrictions through this proceeding will give small entities the opportunity to develop systems that were not previously permitted under the regulations. Small entities that have been unable, to this date, to invest significant resources in research and development in order to design products in compliance with certain strict regulations may now be capable of competing more fairly with the leading manufacturing companies.

In order to provide this additional flexibility and to delete certain regulations, it was necessary to review the existing emission standards in order to determine their relevance to current technology. Most of the existing standards were developed over 30 years ago. Since that time, equipment used in conjunction with the authorized radio services has been improved, particularly in regard to the sensitivity of the equipment. There have also been significant increases in the proliferation of the equipment. It therefore was necessary to tighten a number of the standards on spurious and other undesired emissions. For unintentional radiators, only receivers operating above 30 MHz will be affected by these changes. The standards for CB receivers will be relaxed. Intentional radiators that will be affected by these tightened standards include devices operating in the following frequency bands (current rule sections are shown): 26.99-27.26 MHz (15.116), 40.66-40.70 MHz (control and security alarm devices, 15.205), 46.6-46.98 and 49.66-50.0 MHz (cordless telephones, 15.233), and 49.82-49.90 MHz (15.118).

In addition, this Notice proposes to delete the Automatic Vehicle Identification System (Sections 15.221-15.228) in the 2.9-4.1 GHz band. The potential impact to manufacturers of the latter devices should be offset by the availability of new consumer bands proposed in this item.

This proposal also will affect the suppliers of radio frequency devices in kit form. As long as the kit was designed in a manner such that the completed device complied with the existing regulations, the only impact to the suppliers of kits, other than that shown above, will be the requirement to obtain a grant of equipment authorization from this Commission.

The application of restricted frequency bands to all Part 15 intentional radiators may affect some equipment manufacturers. The only devices that should be operating on these frequencies under the existing Part 15 are transmitters in the 1.7-10 MHz band (Section 15.114), periodic transmitters operating above 70 MHz (Section 15.122), and control and security alarm devices (Section 15.205). It

is also possible that these restricted bands may affect a portion of the frequencies used for biomedical telemetry in the band of 38.0-38.25 MHz. However, the large number of frequency bands proposed to be made available in this proceeding will provide additional frequencies for the operation of such devices. This action should offset any detrimental effects.

Beyond this, we are unable to quantify the potential effects of these action on small entities. Comments are requested on this subject.

V. Recording, record keeping and other compliance requirements:

This proposal provides some decreases in the amount of paperwork performed by manufacturers and importers. The deletion of FCC Form 740 for devices with a power input to the radio frequency stage of no more than 6 nW, musical greeting cards, quartz watches and clocks, modules of quartz watches and clocks, and battery powered hand-held calculators and electronic games not requiring connection to the AC power lines will result in a large decrease in the number of entities that currently are required to file that information. Other reductions in paperwork result from deleting the requirement to obtain an experimental license or a special temporary authorization when testing equipment for compliance with the regulations and deleting the Commission authorization requirements for transmitters operated within a tunnel or a mine.

Increases in paperwork could result for those devices that were formerly subject to the provisions of Section 15.7 of the regulations. This category of devices primarily includes carrier current devices and campus AM radio stations. Under the existing regulations, these devices were required to comply with the regulations, but records indicating such compliance were not required to be retained by the manufacturer. Records demonstrating compliance with the regulations will have to be retained under this proposal. The suppliers of kits will also be subject to additional paperwork. Except for external radio frequency power amplifiers operating below 144 MHz and TV interface devices, the existing regulations do not address kits. Under this proposal, kits will be subject to the appropriate equipment authorization procedures.

VI. Federal rules which overlap, duplicate or conflict with this rule:

None.

VII. Any significant alternatives minimizing impact on small entities and consistent with the stated objectives:

None.

PAPERWORK REDUCTION ACT STATEMENT

56. The proposal contained herein has been analyzed with respect to the Paperwork Reduction Act of 1980 and found to impose a new or modified information collection requirement on the public. Implementation of any new or modified requirement will be subject to approval by the Office of Management and Budget as prescribed by the Act.

57. For further information on this proceeding contact John Reed, Room 7122, Office of Engineering and Technology, FCC, Washington, D. C. 20554, (202) 653-7313.

FEDERAL COMMUNICATIONS COMMISSION

William J. Tricarico
Secretary

APPENDIX

A. Title 47 of the Code of Federal Regulations, Part 2, is amended as follows:

1. Section 2.805 is revised to read as follows:

Section 2.805 Equipment that does not require Commission approval.

In the case of a radio frequency device that, in accordance with the rules in this Chapter, must comply with specified technical standards prior to use, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease), or import, ship or distribute for the purposes of selling or leasing or offering for sale or lease, any such radio frequency device unless, prior thereto, such device complies with the applicable administrative and technical provisions (including verification of the equipment, where required) specified in the Commission's rules.

2. Section 2.806 is amended by revising the title and text to read as follows:

Section 2.806 Exemption for a digital device.

(a) Notwithstanding the provisions in Section 2.805, the announcement and offer for sale of a digital device that is subject to verification under the provisions in Part 15 of this Chapter which is in the conceptual, developmental, design or preproduction stage is permitted prior to verification of compliance, *provided* the prospective buyer is advised in writing at the time of announcement or offer for sale that said equipment is subject to the FCC rules and that said equipment shall comply with the appropriate FCC rules prior to final delivery to the buyer or to centers of distribution.

(b) Manufacturers of Class A digital devices, as defined in Part 15 of this Chapter, shall have the option of ensuring compliance with the applicable technical specifications of this Chapter at each end user's location after installation, provided that the purchase or lease agreement includes a proviso that such a determination of compliance be made and is the responsibility of the manufacturer of the equipment.

(c) A digital device subject to the provisions of this Chapter may be operated prior to a determination of compliance under the following conditions:

- (1) Any digital device may be operated for the purpose of compliance testing.
- (2) Any digital device may be operated for the purpose of demonstration at a trade show provided there is displayed a conspicuous notice that the de-

vice has not been tested for compliance. If a digital device subject to verification is offered for sale or lease at the show, the provisions of Section 2.806(a) shall apply. In accordance with Section 2.803 of this Chapter, a digital device subject to a grant of equipment authorization from the Commission may not be offered for sale or lease prior to issuance of the grant of authorization by the FCC.

(3) Any digital device may be operated at the manufacturer's facilities during developmental, design or preproduction states for evaluation of product performance and determination of customer acceptability.

(4) Where customer acceptability of a Class A digital device cannot be determined at the manufacturer's premises because of size or unique capability of the digital device, a Class A digital device may be operated at the user's site during development, design or preproduction stages for evaluation of product performance and determination of customer acceptability.

3. A new Section 2.948 is added to read as follows:

Section 2.948 Description of measurement facilities.

(a) Each person making measurements of equipment that is subject to an equipment authorization under Part 15 or Part 18 of this Chapter, regardless of whether the measurements are filed with the Commission or kept on file by the manufacturer of the equipment, shall compile a description of their measurement facilities. If the measured equipment is under the verification procedure, these data shall be retained by the party responsible for the equipment. If the equipment is to be authorized by the Commission, these data shall be filed with the Commission's Laboratory in Columbia, Maryland. The data describing the measurement facilities need only be filed once but must be updated as changes are made to the measurement facilities or as otherwise described in this Section.

(b) The description shall contain the following information:

1. Location of the test site.
2. Physical description of the test site accompanied by photographs 8" x 10" in size.
3. A drawing showing the dimensions of the site, physical layout of all supporting structures, and all structures within 5 times the distance between the measuring antenna and the device being measured.
4. Description of structures used to support the measuring set, antennas, and the device being measured.
5. List of measuring equipment used.
6. If chart recorders are used, a chart showing ambient emissions from 30-1000 MHz.
7. Information concerning the calibration of the measuring equipment and when last calibrated. Calibration data shall include the measured impedance data for the Line Impedance Stabilization Networks used.

8. A statement as to whether the test site is available to do measurement services for the public on a fee basis.

9. A plot of site attenuation data taken pursuant to FCC Bulletin OET 55 using a tuned dipole antenna (this provision does not apply to equipment which is not measured on an open field test site).

10. A description of the types of measurements which would be performed at the test facility.

11. A sample calculation showing how the readings taken from the instrumentation used are converted to the levels specified in the applicable rule sections.

(c) The description shall be kept current at all times. The description needs to be filed only once but must be updated as changes are made to the measurement facilities. However, at least every three years, the organization required to file the data with the Commission shall certify that the data on file is current.

(d) The Commission will publish a list of those parties that indicate they wish to perform measurement services for the public. However, it should be noted that the Commission does not endorse or approve any facility on this list.

4. Section 2.955 is amended by adding a new subparagraph (a)(3) and revising paragraphs (a) and (b) to read as follows:

Section 2.955 Retention of records.

(a) For equipment subject to verification, the records listed below shall be maintained by the manufacturer, importer or other party located within the U. S. responsible for the distribution of the equipment.

* * * * *

(3) A record of the measurements made on an appropriate test site that demonstrates compliance with the applicable regulations. The record shall identify the measurement procedure that was used and shall include all the data required to show compliance with the appropriate regulations.

(b) If verification is performed by the manufacturer, importer or any other supplier of the equipment, the records listed in paragraph (a) of this Section shall be retained for two years after the manufacture, importation or supply of said equipment has been permanently discontinued. If verification is performed by an equipment operator, the records listed in paragraph (a) of this Section shall be retained until the operation of the equipment has been permanently discontinued. Regardless of these time frames, if the manufacturer, importer, supplier or user of equipment subject to verification is officially notified that an investigation or any other administrative proceeding involving the equipment has been instituted, the records listed in paragraph (a) of this Section shall be retained until the conclusion of that investigation or proceeding.

5. Section 2.975 is amended by revising subparagraph (a)(5) and by adding new paragraphs (f) and (g) to read as follows:

Section 2.975 Application for notification.

(a) * * *

* * * * *

(5) For devices operated under the provisions of Part 15 of this Chapter, photographs showing the general appearance and the controls available to the user. Photographs should be 8 by 10 inches in size. Smaller photographs may be submitted provided they are sharp and clear, show the necessary detail, and are mounted on paper between 8 by 10 1/2 inches and 8 1/2 by 11 inches. For devices operated under the provisions of any other Part and where it is specifically required under the rule section(s) under which the device is to be operated, photographs of the equipment of sufficient clarity to reveal its external appearance and size, both front and back;

* * * * *

(f) For a composite system which incorporates only devices subject to certification, verification and/or notification and which are contained in a single enclosure, an application (FCC Form 731) shall be submitted for each type of device within the enclosure. At the option of the applicant, a single FCC identifier may be requested for that system. Fees are based on the number of devices and type of authorizations.

(g) The records of measurement data, measurement procedures, photographs, circuit diagrams, etc. for the device to which the application applies shall be retained for two years after the manufacture of said equipment has been permanently discontinued, or until the conclusion of an investigation or proceeding if the manufacturer or importer is officially notified that an investigation or any other administrative proceeding involving the equipment has been instituted.

6. Section 2.1033 is amended by revising paragraphs (b) and (c) and by adding new subparagraphs (b)(1) through (b)(9) to read as follows:

Section 2.1033 Application for certification.

* * * * *

(b) The application shall be accompanied by a technical report containing the following information:

- (1) The full name and mailing address of the manufacturer of the device.
- (2) FCC identifier.

(3) A copy of the installation and operating instructions to be furnished the user. A draft copy of the instructions may be submitted if the actual document is not available. The actual document shall be furnished to the FCC when it becomes available.

(4) A description of the circuit functions of the device along with a statement describing how the device operates. This statement should contain a description of the ground system and antenna, if any, used with the device.

(5) A block diagram showing the frequency of all oscillators in the device. The signal path and frequency shall be indicated at each block. The tuning range(s) and intermediate frequency(ies) shall be indicated at each block. A schematic diagram also is required for intentional radiators.

(6) A report of measurements of radiated and conducted emissions. This shall identify the test procedure used, the date the measurements were made, the location where the measurements were made, the device tested (model and serial number, if available), and the name and address of the applicant and the manufacturer. It shall also include a sample calculation showing how the obtained measurements are converted to the levels specified in the applicable rule sections.

(7) A sufficient number of photographs to clearly show the exterior appearance, the construction, the component placement on the chassis, and the chassis assembly. The exterior views shall show the overall appearance, the antenna used with the device (if any), the controls available to the user, and the required identification label in sufficient detail so that the name and model number can be read. In lieu of a photograph of the label, a sample label (or facsimile thereof) may be submitted together with a sketch showing where this label will be placed on the equipment. Photographs shall be 8 by 10 inches in size. Smaller photographs may be submitted provided they are sharp and clear, show the necessary detail, and are mounted on paper between 8 and 10 1/2 inches and 8 1/2 by 11 inches in size. A sample label or facsimile together with the sketch showing the placement of this label shall be on the same size paper.

(8) If the application is for equipment modified to achieve compliance with applicable Commission requirements, a detailed description of the changes made to the equipment for this purpose. Applicants are advised that extensive retrofitting of a device may result in a denial of the application unless the applicant attests that it will make the specified changes to all equipment marketed under the applied for grant of certification.

(9) For a device used in decoding the Emergency Broadcast System Attention Signal as defined in Section 73.906, the value of the necessary voltage (RMS) or range of voltages of the attention signal to be applied to the input terminals of the decoder which will cause the desired response of the device shall be submitted to the Commission with the certification data. In the event that input signals other than the attention signal (excluding signals which in combination form the attention signal), including

signals outside this voltage range, will cause false responses by the device, a description of such signals and their input voltage levels that cause such false responses shall be specified in the application and appropriate warnings shall be included in the instructions furnished to the user. The susceptibility of the device to false responses and any lack of reliability in responding to the attention signal at input levels within the rated voltage range may be regarded by the Commission as cause to deny certification.

(c) For a composite system that incorporates only devices subject to certification, verification and/or notification and that are contained in a single enclosure, an application (FCC Form 731) shall be submitted for each type of device within the enclosure. At the option of the applicant, a single FCC identifier may be requested for that system. Fees are based on the number of devices and type of authorizations.

7. Section 2.1043 is amended by adding a new paragraph (e) and new subparagraphs (b)(3) and (b)(4) to read as follows:

Section 2.1043 Changes in certificated equipment.

* * * * *

(b) * * *

(1) * * *

(2) * * *

(3) In the case of equipment which is tested for certification with attached peripheral devices, a Class I permissive change includes those modifications that do not degrade the performance characteristics when the equipment is tested in both the modified and unmodified versions with the same peripheral(s). A Class II permissive change includes those modifications that degrade the performance characteristics using this same procedure. Examples of possible Class II changes include changes in the grounding or bonding structure, the shielding integrity of the enclosure, or the filtering design, major revisions to the printed circuit board layout, and the adding of additional circuitry.

(4) Permissive changes, as detailed above, shall be made only by the holder of the grant of certification. Changes by any party other than the grantee requires a new application for and grant of certification.

(c) * * *

(d) * * *

(e) Major modifications to certified devices require the equipment to be reidentified. A new, complete application for certification must be filed with the Commission, and a new grant of certification must be obtained before market-

ing the modified device. Examples of major modifications include replacement of an internal circuit board with one of a different type (Note: digital devices may interchange subassembly circuit boards, excluding mother boards and power supplies, and certified or verified, as appropriate, circuit boards under the provisions contained in Part 15 of this Chapter), changes in digital devices to the clock speed, board layers, layout or filtering, and changes to the frequency multiplication circuitry, basic modulator circuitry and maximum power rating.

8. Section 2.1201 is amended by adding a new paragraph (c) after the Note to read as follows:

Section 2.1201 Purpose.

* * * * *

(c) The provisions of this Subpart shall not apply to musical greeting cards, quartz watches and clocks, modules of quartz watches and clocks, radio frequency devices that have a power input to the radio frequency stage of no greater than 6 nW, and battery powered hand-held calculators and electronic games not requiring connection to the AC power lines.

B. Title 47 of the Code of Federal Regulations, Part 15, is amended by deleting the present index and text and replacing it with the following:

Part 15 - RADIO FREQUENCY DEVICES

Subpart A - General

Section 15.1 Scope of this Part.
 Section 15.3 Definitions.
 Section 15.5 General conditions of operation.
 Section 15.7 Special temporary authority.
 Section 15.9 Prohibition against eavesdropping.
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Section 15.247 Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz.

Section 15.249 Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5875 MHz, and 24.0 - 24.25 GHz.

AUTHORITY: Sections 4, 302, 303, and 307 of the Communications Act of 1934, as amended; 47 USC 154, 302, 303, 307.

Subpart A - General

Section 15.1 Scope of this Part.

(a) This Part sets out the regulations under which an intentional, unintentional, or incidental radiator may be operated without an individual license. It also contains the

technical specifications, administrative requirements and other conditions relating to the marketing of Part 15 devices.

(b) The operation of an intentional or unintentional radiator that is not in accordance with the regulations in this Part must be licensed pursuant to the provisions of Section 301 of the Communications Act of 1934, as amended, unless otherwise exempted from the licensing requirements elsewhere in this Chapter.

(c) The operation or marketing of an intentional or unintentional radiator that is not in compliance with the administrative and technical provisions in this Part, including prior Commission authorization or verification, as appropriate, is prohibited under Section 302 of the Communications Act of 1934, as amended, and Subpart I of Part 2 of this Chapter, unless that equipment has been specifically exempted from these provisions (see Sections 15.13, 15.23, 15.103, and 15.113). The equipment authorization and verification procedures are detailed in Subpart J of Part 2 of this Chapter.

Section 15.3 Definitions.

(a) *Auditory assistance device.* An intentional radiator used to provide auditory assistance to a handicapped person or persons. Such a device may be used for auricular training in an educational institution, for auditory assistance at places of public gatherings, such as a church, theatre, or auditorium, and for auditory assistance to handicapped individuals, only, in other locations.

(b) *Biomedical telemetering device.* An intentional radiator consisting of one or more transmitters which are used to transmit within a localized area measurements of either human or animal biomedical phenomena to a receiver.

(c) *Cable terminal device.* A restricted radiation device that connects to a cable system operated under Part 76 of this Chapter. This may include some receivers and TV interface devices, among others.

(d) *Calculator.* A digital device used for performing calculations and which is not capable of being programmed to branch on condition, e.g., "IF . . . , GO TO . . .".

(e) *Carrier current system.* A system that transmits radio frequency energy by conduction over the electric power lines. This system can be designed such that the signals are received by conduction directly from connection to the electric power lines (unintentional radiator) or the signals are received over-the-air due to radiation of the radio frequency signals from the electric power lines (intentional radiator).

(f) *CB receiver.* Any receiver that operates in the Personal Radio Services on frequencies allocated for Citizens Band (CB) Radio Service stations, as well as any receiver provided with a separate band specifically designed to receive the transmissions of CB stations in the Personal Radio Services. This includes the following: (1) a CB receiver sold as a separate piece of equipment; 2) the receiver section of a CB transceiver; 3) a converter to be used with any receiver for the purpose of receiving CB transmissions; and, 4) a multiband receiver that includes a band labelled "CB" or "11-meter" in which such band can be separately selected, except that an Amateur Radio Service receiver that was manufactured prior to January 1, 1960, and which includes an 11-meter band shall not be considered to be a CB receiver.

(g) *Class A digital device.* A digital device that is marketed for use in a commercial, industrial or business environment, exclusive of a device that is marketed for use by the general public, or which is intended to be used in the home.

(h) *Class B digital device.* A digital device that is suitable for use in a residential environment notwithstanding use in a commercial, business or industrial environment. Examples of such devices include, but are not limited to, personal computers, calculators, and similar electronic devices that are marketed for use by the general public. Digital devices marketed through a retail outlet or direct mail order catalog or for which notices of sale or advertisements are distributed or directed to the general public rather than restricted to commercial users shall be considered Class B devices. If a manufacturer can demonstrate that because of price or performance characteristics a particular device is not suited for residential or hobbyist use, they may request that the digital device be considered to be a Class A device.

Note: A manufacturer may also qualify a device intended to be marketed in a commercial, business or industrial environment as a Class B digital device, and in fact is encouraged to do so. In the event a particular type of device is found to repeatedly cause harmful interference to radio communications, the Commission may classify such a device as a Class B digital device, regardless of its intended use.

(i) *Cordless telephone system.* This consists of two transceivers, one of which, the base station, is directly connected to the public switched telephone network. The mobile unit communicates directly with the base station. Transmissions from the mobile unit which are received by the base station are placed on the public switched telephone network. Information received from the switched telephone network is transmitted by the base station to the mobile unit. Note - the Domestic Public Cellular Radio Telecommunications Service is considered to be part of the switched telephone network.

(j) *Digital device.* (Previously defined as a computing device). An unintentional radiator (device or system) that generates and uses timing signals or pulses at a rate in excess of 9,000 pulses (cycles) per second and uses digital techniques; inclusive of telephone equipment that uses digital techniques or any device or system that generates and uses radio frequency energy for the purpose of performing data processing functions, such as electronic computations, operations, transformations, recording, filing, sorting, storage, retrieval, or transfer. Radio frequency devices that are specifically subject to an emanation requirement in another Part of this Chapter and intentional radiators subject to Subpart C of this Part are excluded from this definition, provided the digital portion of the device is used only to enable operation of the device and does not control additional functions or capabilities.

Note: Computer terminals and peripherals (i.e., Input/Output devices for computers) that are intended to be connected to a computer are considered to be digital devices.

(k) *Field disturbance sensor.* A device incorporating an intentional radiator that establishes a radio frequency field in its vicinity and detects changes in that field. It includes

a perimeter protection system which uses buried leaky cables installed around a facility to detect any unauthorized entry or exit.

(l) *Harmful interference.* Any emission, radiation or induction that endangers the functioning of a radio navigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radiocommunications service operating in accordance with this Chapter.

(m) *Home - built devices.* An intentional or unintentional radiator not constructed from a kit but built in quantities of five or less for personal use.

(n) *Incidental radiator.* A device that generates radio frequency energy during the course of its operation although the device is not intentionally designed to generate or emit radio frequency energy.

(o) *Intentional radiator.* A device that intentionally generates and emits radio frequency energy by radiation or induction.

(p) *Kit.* Any number of electronic parts, usually provided with a schematic diagram or printed circuit board, which, when assembled in accordance with instructions, results in a device subject to the regulations in this Part, even if additional parts of any type are required to complete assembly.

(q) *Marketing.* As used in this Part, marketing includes sale or lease, offer for sale or lease (including advertising for sale or lease), and importation or shipment or other distribution for the purpose of sale or lease or offer for sale or lease.

(r) *Peripheral device.* An input/output unit of a system that feeds data into and/or receives data from the central processing unit of a digital device, including, for example, terminals, printers, floppy disk devices, other data storage devices, video monitors, keyboards, control cards, interface boards, memory expansion cards and other input/output devices that may or may not contain digital circuitry.

(s) *Personal computer.* A digital device that is capable of performing computations, can branch on condition, e.g., "IF . . . , GO TO . . . ", and is suitable for use in the home, notwithstanding business applications. Such computers are considered Class B digital devices. Computers which can use a standard TV receiver as a display device, are portable, or meet all of the following conditions are considered examples of personal computers:

- (1) Marketed through a retail outlet or direct mail order catalog.
- (2) Notices of sale or advertisements are distributed or directed to the general public or hobbyist users rather than restricted to commercial users.
- (3) Operates on a battery or 120 volt electrical supply.

If the manufacturer can demonstrate that because of price or performance the computer is not suitable for residential or hobbyist use or, except for portable computers, the manufacturer controls the marketing of the equipment in such a manner as to ensure that final sale of the product is not to a residential operator, he may request that the computer be considered to fall outside the scope of this definition of personal computers.

(t) *Power line carrier systems.* An unintentional radiator employed as a carrier current system used by an electric power utility entity on transmission lines for protective relaying, telemetering, etc. for general supervision of the power system. The system operates by the transmission of radio frequency energy by conduction over the electric power transmission lines of the system. The system does not include those electric lines which connect the distribution substation to the customer or house wiring.

(u) *Radio frequency (RF) energy.* Electromagnetic energy at any frequency in the radio spectrum between 9 kHz and 3,000,000 MHz.

(v) *Scanning receiver.* For the purpose of this rule Part, this is a receiver that automatically switches among four or more frequencies in the range of 30 to 1000 MHz and which is capable of stopping at and receiving a radio signal detected on a frequency. Receivers designed solely for the reception of the broadcast signals under Part 73 of the regulations or for operation as part of a licensed station are exempted from this definition.

(w) *Television broadcast receiver.* Apparatus designed to receive television and sound broadcast simultaneously on the television channels which are authorized under Part 73 of this Chapter.

(x) *TV interface device.* An unintentional radiator that produces a radio frequency carrier modulated by a video signal derived from an external or internal source, and which feeds the modulated radio frequency energy by conduction to the antenna terminals of a television broadcast receiver. A TV interface device may include a stand-alone RF modulator, video source and other components which contribute to the total system, excluding television broadcast receivers.

(y) *Unintentional radiator.* A device that intentionally generates radio frequency energy for use within the device, or that sends signals by conduction to associated equipment via connecting wires, but which is not intended to emit RF energy by radiation or induction.

Section 15.5 General Conditions of Operation.

(a) Persons operating intentional or unintentional radiators shall not be deemed to have any vested or recognizable right to continued use of any given frequency by virtue of prior registration or certification of equipment, or, for power line carrier systems, on the basis of prior notification of use pursuant to Section 90.63(g) of this chapter.

(b) Operation of an intentional, unintentional, or incidental radiator is subject to the conditions that no harmful interference is caused and that interference must be accepted that may be caused by the operation of an authorized radio station, by another intentional or unintentional radiator, by industrial, scientific and medical (ISM) equipment, or by an incidental radiator.

(c) The operator of a radio frequency device shall be required to stop operating the device upon notification by a Commission representative that the device is causing harmful interference.

(d) Intentional radiators that produce Class B emissions (damped wave) are prohibited.

Section 15.7 Special temporary authority.

(a) The Commission will, in exceptional situations, consider an individual application for a special temporary authorization to operate an incidental, intentional or unintentional radiation device not conforming to the provisions of this Part, where it can be shown that the proposed operation would be in the public interest, that it is for a unique type of station or for a type of operation which is incapable of being established as a regular service, and that the proposed operation can not feasibly be conducted under this Part.

(b) No authorization is required in order to perform testing of equipment for determining compliance with these regulations. This provision does not permit the providing of equipment to potential users in order to determine customer acceptance of the product or marketing strategy, nor does this provision permit any type of operation other than a determination of compliance with the regulations. During this testing, the provisions of Section 15.5 apply.

Section 15.9 Prohibition against eavesdropping.

Except for the operations of law enforcement officers conducted under lawful authority, no person shall use, either directly or indirectly, a device operated pursuant to the provisions of this Part for the purpose of overhearing or recording the private conversations of others unless such use is authorized by all of the parties engaging in the conversation.

Section 15.11 Cross reference.

The provisions of Subparts A, H, I, J and K of Part 2 apply to intentional and unintentional radiators, in addition to the provisions of this Part.

Section 15.13 Incidental radiators.

An incidental radiator shall be operated so that the radio frequency energy that is emitted does not cause harmful interference. In the event that harmful interference is caused, the operator of the device shall promptly take steps to eliminate the harmful interference including, if necessary, cessation of operation. Manufacturers of these devices shall employ good engineering principles to ensure that the risk of interference is minimal.

Section 15.15 General technical requirements.

(a) An intentional or unintentional radiator shall be constructed in accordance with good engineering design and manufacturing practice. Emanations from the device shall be suppressed as much as practicable, but in no case shall the emanations exceed the levels specified in these rules.

(b) An intentional or unintentional radiator must be constructed such that the adjustments of any control accessible to the user will not cause operation of the device in violation of the regulations.

(c) Equipment manufacturers should note that the limits specified in this Part will not prevent interference under all circumstances. Since the operators of Part 15 devices

are required to cease operation should harmful interference occur to authorized users of the radio frequency spectrum, equipment manufacturers are encouraged to employ the minimum field strength necessary for communications, to provide greater attenuation of unwanted emissions than required by these regulations, and to advise the user as to how to resolve interference problems (for example, see Section 15.105(b)).

Section 15.17 Susceptibility to interference.

(a) Manufacturers are advised to consider the proximity and the high power of non-government licensed radio stations, such as broadcast and land mobile stations, and U. S. Government radio stations when choosing operating frequencies during the design of their equipment so as to reduce the susceptibility for receiving interference. Information on non-government use of the spectrum can be obtained by consulting the table of frequency allocations in Section 2.106 of this Chapter.

(b) Manufacturers may obtain information on Government operations by contacting: Director, Spectrum Plans and Policy, National Telecommunications and Information Administration, Department of Commerce, Room 4096, Washington, D. C. 20230.

Section 15.19 Labelling requirements.

(a) In addition to the label bearing the FCC identifier and other information specified in Sections 2.925 and 2.926 of this Chapter, except as otherwise shown in paragraph (c) of this Section, a device subject to certification or notification shall bear the following statement in a conspicuous location on the device:

This device complies with FCC Rules Part 15. Operation is subject to the following two conditions: (1) this device may not cause radio interference, and (2) this device must accept any interference received including interference that may cause undesired operation.

(b) In addition to the identification required by Section 2.954 of this Chapter, except as otherwise shown in paragraph (c) of this Section, a device subject to verification shall bear the following statement in a conspicuous location on the device:

This device has been verified to comply with FCC Rules Part 15. Operation is subject to the two following conditions: (1) this device may not cause radio interference, and (2) this device must accept any interference received including interference that may cause undesired operation.

(c) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under Part 73, land mobile operation under Part 90, etc., shall use a label similar to that specified in either paragraph (a) or (b), as appropriate, with the second condition deleted.

(d) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified in paragraph (a) or (b) needs to be affixed only to the main control unit.

(e) When the device is so small or for such use that it is not practicable to place the statement specified in paragraph (a) or (b) on it, the information required by these paragraphs shall be placed on the first page of the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

Section 15.21 Information to user.

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

Section 15.23 Home - built devices.

(a) An equipment authorization is not required for home-built devices, as defined in Section 15.3(m).

(b) It is recognized that the individual builder of this equipment may not possess the means to perform the measurements to determine compliance with the regulations. In this case, the builder is expected to employ good engineering practices so as to meet the specified technical standards to the greatest extent practicable. The provisions of Section 15.5 apply to this equipment.

(c) Devices constructed under the provisions of this Section shall not be marketed.

(d) The provisions of this Section do not apply to a device which is constructed from a kit.

Section 15.25 Kits.

An unintentional or intentional radiator marketed as a kit shall comply with the following requirements:

(a) All parts necessary for the assembled device to comply with the technical requirements of this Part must be supplied with the kit. No mechanism for adjustment that can cause operation in violation of the requirements of this Part shall be made accessible to the builder.

(b) Two units of the kit shall be assembled in accordance with the instructions supplied with the product to be marketed. If all components required to fully complete the kit (other than those specified in paragraph (a) for compliance with the technical provisions) are not normally furnished with the kit, assembly shall be made using the recommended components. The assembled unit shall be authorized or verified, as appropriate, pursuant to the requirements of this Part.

(1) The measurement data required for a device subject to certification shall be obtained for each of the two units and submitted with an application for certification pursuant to Subpart J of Part 2 of this chapter.

(2) The measurement data required for a device subject to notification or verification shall be obtained for each of the two units and retained on file pursuant to the provisions of Subpart J of Part 2 of this Chapter.

(c) A copy of the exact instructions that will be provided for assembly of the device shall be submitted with an application for certification or shall be kept on file for devices subject to notification or verification. Those parts which are not normally furnished shall be detailed in any application for certification or in the verification or notification data kept on file.

(d) In lieu of the label required by Section 15.19, the following label, along with the label bearing the FCC identifier and other information specified in Sections 2.925 and 2.926 or the manufacturer's unique identification label for equipment subject to verification, shall be included in the kit with instructions to the builder that it shall be attached to the completed kit:

(Manufacturer's Name)
(FCC or Unique Identifier)

This device can be expected to comply with Part 15 of the FCC Rules provided it is assembled in accordance with the instructions provided with this kit. Operation is subject to the following conditions: (1) this device may not cause radio interference, and (2) this device must accept any interference received including interference that may cause undesired operation.

Note: The second condition in the above label may be deleted for kits of receivers associated with the operation of a licensed radio service.

Section 15.27 Special accessories.

(a) Where special accessories, such as shielded cables and/or special connectors, are required to enable an unintentional or intentional radiator to comply with the emission limits in this Part, the equipment must be marketed with those special accessories. The instruction manual for such devices shall include appropriate instructions on the first page of the text concerned with the installation of the device that these special accessories must be used with the device. If a device requiring special accessories is installed by or under the supervision of the party marketing the device, it is the responsibility of that party to use such special accessories.

(b) Accessory items that can be readily obtained from multiple sources are not considered to be special accessories and are not required to be marketed with the equipment. However, the manual included with the equipment must specify what additional components or accessories are required to be used in order to ensure compliance with this Part.

(c) Any accessories or components included with the equipment being marketed must be of the type needed in order to comply with the regulations.

Section 15.29 Inspection by the Commission.

(a) Any equipment or device subject to the provisions of this Part, together with any certificate, notice of registration or any technical data required to be kept on file by the operator, manufacturer or supplier of the device shall be made available for inspection by a Commission representative upon reasonable request.

(b) The owner or operator of a radio frequency device subject to this Part shall promptly furnish to the Commission or its representative such information as may be requested concerning the operation of the radio frequency device.

(c) The manufacturer or other party responsible for any device subject to this Part shall promptly furnish to the Commission or its representatives such information as may be requested concerning the operation of the device, including a copy of any measurements made for obtaining an equipment authorization or demonstrating compliance with the regulations.

(d) The Commission, from time to time, may request the manufacturer or importer to submit to the FCC Laboratory in Columbia, Maryland, various equipment to determine the extent to which subsequent production of such equipment continues to comply with the applicable standards. Shipping costs to the Commission's Laboratory and return shall be borne by the manufacturer or importer.

Section 15.31 Measurement procedures.

(a) The following measurement procedures are used by the Commission to determine compliance with the technical requirements:

- (1) FCC/OET MP-2: FCC Procedure for Measuring UHF Noise Figures of TV Receivers.
- (2) FCC/OET MP-3: FCC Procedure for Measuring RF Emissions from TV interface devices.
- (3) FCC/OET MP-4: FCC Procedure for Measuring RF Emissions from Digital Electronic Equipment.
- (4) FCC/OET MP-xx: FCC Procedure for Measuring RF Emissions from TV and FM receivers.
- (5) FCC/OET MP-xx: FCC Procedure for Measuring RF Emissions from Special Purpose Receivers (Superregenerative, Communications and CB Receivers).
- (6) FCC/OET MP-xx: FCC Procedure for Measuring RF Emissions from Intentional Radiators from 9 kHz to 30 MHz.
- (7) FCC/OET MP-xx: FCC Procedure for Measuring RF Emissions from Intentional Radiators from 30 MHz to 1 GHz.
- (8) FCC/OET MP-xx: FCC Procedure for Measuring RF Emissions from Intentional Radiators from 1 GHz to xx GHz.

(b) All parties making compliance measurements on equipment subject to the requirements of this Part are urged to use these measurement procedures. If the party desires to use other procedures, the party should consult with the Commission's Laboratory staff to ensure that such other procedures can be relied on to produce measurement results that are compatible with the FCC measurement procedures. The request for consultation should be in writing, with a detailed description of the proposed procedure, including a list of the test equipment to be employed. If accepted by the Commission, the description of the measurement procedure, and list of test equipment shall be made part of an application for certification or

included with the data required to be retained by the party responsible for devices subject to notification or verification.

(c) For swept frequency equipment, measurements shall be made with the frequency sweep stopped.

(d) Field strength measurements shall be made, to the extent possible, on an open field site. In the case of equipment for which measurements can be performed only at the installation site, such as perimeter protection systems, carrier current systems, and systems employing a "leaky" coaxial cable as an antenna, measurements for verification or for obtaining a grant of equipment authorization shall be performed at a minimum of three installations that can be demonstrated to be representative of typical installation sites.

(e) For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental, as appropriate, shall be performed with the supply voltage varied between 85 and 115 percent of the nominal rated supply voltage. For battery operated equipment, the variation in supply voltage shall be from the battery operating end point to the voltage of a new battery.

(f) If the device under test is measured at a distance other than the distance specified in the regulations, the measurement procedure publications should be consulted to determine the proper extrapolation factor. Should this factor not be referenced in the measurement procedure publications, measurements shall be made a minimum of two different distances to determine the extrapolation factor.

(1) The distance specified in the regulations applies to the distance between the measuring instrument antenna and the closest point of any part of the device or system under test.

(2) The applicant for a grant of certification shall specify the method used in the application filed with the Commission. For equipment subject to notification or verification, this information shall be retained with the measurement data.

(3) In those cases where the Commission tests the equipment, at measurement distances of 30 meters or less the Commission will test the equipment at the distance specified in the regulations. For measurement distances greater than 30 meters, the Commission will extrapolate the measured field strength using the method stated in the appropriate measurement procedure or, lacking such a procedure, by making measurements at a minimum of two different distances to determine the extrapolation relationship.

(4) The measurement of emissions at a distance greater than that specified in the regulations is not permitted unless it can be demonstrated to the Commission that because of size or other factors measurement at the specified distance is not practicable.

(g) Equipment under test shall be adjusted, using those controls available to the consumer, in such a manner as to maximize the level of the emissions. For those devices to which wire leads may be attached by the consumer, tests shall be performed with wire leads attached. The wire leads shall be of the length to be used with the equipment

if that length is known. Otherwise, various lead lengths, up to the maximum length that may be employed with the equipment, should be investigated to determine which length maximizes the level of the emissions. Tests shall be performed with that determined lead length.

(h) For a composite system that incorporates devices contained either in a single enclosure or in separate enclosures connected by wire or cable, testing for compliance with the standards in this Part shall be performed with all of the devices in the system functioning.

(i) If the device under test provides for the connection of external accessories, including external electrical input signals, the device shall be tested with the accessories attached. The device under test shall be fully exercised with these external accessories. The emission tests shall be performed with the device and accessories configured in a manner that tends to produce maximized emissions within the range of variations that can be expected under normal operating conditions. In the case of multiple accessory external ports, an external accessory shall be connected to one of each type of port.

(j) If the equipment under test consists of a central control unit and an external or internal accessory(ies) (peripheral) and the company verifying the equipment or applying for a grant of equipment authorization manufacturers or assembles the central control unit and at least one of the accessory devices intended to be used with that control unit or intends to market or use the control unit with a specific accessory(ies), testing of the control unit and the accessory(ies) must be performed using the devices manufactured or assembled by that company or using the specific combination of equipment which is intended to be marketed or used together.

(k) For a composite system which incorporates devices contained either in a single enclosure or in separate enclosures connected by wire or cable, in those cases where the individual devices are subject to different technical standards, it must be demonstrated that those emissions from the composite system that exceed the limits for the device subject to the more stringent standards are generated by a device for which the standards authorize higher emission limits.

(l) Measurements of radio frequency emissions conducted over the public utility power lines shall be performed using a 50 ohm/50 uH line-impedance stabilization network (LISN); however, receivers utilizing the temporary provisions shown in Section 15.107 shall employ a 50 ohm/5 uH LISN.

(m) For emissions that are wider than the bandwidth of the measuring instrument, suitable adjustment, normally detailed in the application notes for the measuring instrument, shall be made to the levels of the detected emissions. In many cases, the appropriate adjustment is detailed in the Commission's measurement procedures. For example, under MP-4 for the measurement of RF energy conducted on the AC power lines from digital devices, if the level of the emission measured using quasi-peak instrumentation is 6 dB, or more, higher than the level of the same emission measured with instrumentation having an average detector and a 9 kHz bandwidth, that emission is considered to be broadband and a 13 dB reduction to the quasi-peak instrumentation results may be employed. Complete details concerning such adjustments shall be reported to the Commission or retained, as appropriate.

Section 15.33 Range of measurements.

(a) For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency generated in the equipment up to at least (1) the 10th harmonic of the fundamental frequency or to the highest frequency practicable in the present state of the art of measuring techniques, whichever is lower, or (2) the range of frequencies shown in paragraph (b) of this Section, whichever is the higher of the two ranges.

(b) For an unintentional radiator, the spectrum shall be investigated over the frequency range specified below:

Highest frequency generated in the device or on which the device operates or tunes	Range of frequency measurements	
	Lowest frequency	Highest frequency
Below 1705 kHz	9kHz	20 MHz
1.705 - 10 MHz	Lowest frequency produced in the device	400 MHz
10 - 30 MHz	Lowest frequency produced in the device	500 MHz
30 - 108 MHz	Lowest frequency produced in the device or 25 MHz, whichever is lower	1000 MHz
108 - 500 MHz	Lowest frequency produced in the device or 25 MHz whichever is lower	2000 MHz
500 - 1000 MHz	Lowest frequency produced in the device or 100 MHz, whichever is lower	5000 MHz
Above 1000 MHz	Lowest frequency produced in the device or 100 MHz whichever is lower	5th harmonic of the operating frequency or state-of-the-art, whichever is lower

(c) Particular attention should be paid to harmonics and subharmonics of the fundamental frequency as well as to those frequencies removed from the fundamental by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.

(d) The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this Part.

Section 15.35 Emission limits.

The conducted and radiated emission limits shown in this Part are based on the following, unless otherwise specified:

(a) On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths. The specifications for the measuring set using the CISPR quasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Interference (CISPR) of the International Electrotechnical Commission.

(b) On any frequency or frequencies above 1000 MHz, the limits shown are based on the peak value of the radio frequency emission.

Subpart B - Unintentional Radiators

Section 15.101 Equipment authorization of unintentional radiators.

(a) Except as otherwise exempted in Sections 15.23, 15.103, and 15.113, unintentional radiators shall be authorized by the Commission or verified prior to the initiation of marketing, as follows:

Type of Device	Equipment Authorization Required *
TV broadcast receiver	Verification
FM broadcast receiver	Verification
CB receiver	Certification
Superregenerative receiver	Certification
Scanning receiver	Certification
All other receivers subject to Part 15	Notification
TV interface device	Certification
Cable terminal device	Certification
Class B personal computers & peripherals	Certification
Other Class B digital devices & peripherals	Verification
Class A digital devices & peripherals	Verification
Switching power supplies	Verification
All other devices	Verification

* See additional provisions in this Section and in Section 15.103 of this Part.

(b) Only those receivers that operate (tune) within the frequency range of 30-1000 MHz and CB receivers are subject to the authorizations shown in paragraph (a). However, receivers indicated as being subject to notification that are contained within a transceiver, the transmitter portion of which is subject to type acceptance or certification, shall be authorized under the verification procedure. Receivers operating above 1000 MHz or below 30 MHz, except for CB receivers, are exempt from complying with the technical provisions of this Part but are subject to Section 15.5.

(c) Personal computer mother boards (the circuit board performing the central processing) that are marketed with an enclosure and a power supply must be certificated with that enclosure and power supply. These combinations are considered to be kits (see Section 15.25) or complete devices, depending on the manner in which they are marketed.

(d) Digital device peripherals shall be certified or verified, as appropriate, prior to marketing. Peripherals include: any Class A or B device external to the digital device; devices internal to the digital device enclosure that connect the digital device to an external device by wire or cable; and, circuit boards or cards that increase the operating or processing speed of a digital device. An internal device that contains the central processing unit is not considered to be a peripheral even though such a device may connect to an external keyboard; however, when such a device connects to an external peripheral other than a

keyboard, the circuitry providing this connection, other than the portion containing the central processing unit, may be authorized, at the option of the manufacturer, as a peripheral.

(e) Subassemblies to digital devices are not subject to the technical standards in this Part unless they are marketed as part of a system in which case paragraphs (g) and (h) of this Section apply. Subassemblies include: those devices not listed in paragraph (d), such as internal disc drives and memory expansion units, that are enclosed solely within the enclosure housing the digital device; digital devices marketed to another manufacturer to be incorporated into a final product; circuit boards containing the central processing unit that are marketed without an enclosure or power supply; and, switching power supplies marketed solely for use internal to a digital device.

(f) Except as otherwise shown in paragraph (c) of this Section, switching power supplies external to a digital device are subject to verification.

(g) Personal computers marketed as systems that are assembled from subassemblies and from modules that have been separately certified are not required to be reauthorized by the Commission provided: 1) there is no change in identification of the equipment and the original label and identification on each piece of equipment remain unchanged; and, 2) each manufacturer's instructions to ensure compliance (including, if necessary, the use of shielded cables or other accessories) are followed when the system is configured. The system that is marketed must comply with the applicable conducted and radiated emission limits.

(1) A change in identification can be accomplished by following the procedures specified in Subpart J of Part 2 of this Chapter.

(2) It should be noted that the Commission does not certify stand-alone mother boards, enclosures or power supplies. In accordance with paragraphs (e) and (f), these devices are considered to be subassemblies or, in the case of external switching power supplies, are required to be separately verified. In order to comply with the provisions in paragraph (g), the specific combination of mother board, enclosure and power supply must be certified by the Commission as either a kit or a finished product (see paragraph (c)).

(h) Class A and Class B digital devices, other than personal computers, that are assembled from subassemblies and from modules that have been separately verified are not required to be reverified provided: 1) there is no change in identification of the equipment and the original label and identification on each piece of equipment remain unchanged; and, 2) each manufacturer's instructions to ensure compliance (including, if necessary, the use of shielded cables or other accessories) are followed when the system is configured. The system that is marketed must comply with the applicable conducted and radiated emission limits.

(1) A change in identification or the configuration of a system without following the manufacturer's instructions to ensure compliance requires the completed system to be reverified for compliance.

(2) As with personal computers, the specific combination of mother board, enclosure and power supply must be verified for compliance with the regulations.

(i) Portable, battery operated personal computers that have a power consumption of not greater than 0.1 watt and utilize a clock rate not greater than 1.0 MHz and portable, battery operated peripherals to such computers shall be subject to the provisions specified for calculators. The connection of these devices to the AC power lines is permitted provided these devices are designed to use batteries as their primary source of power.

(j) The procedures for obtaining a grant of equipment authorization or for verification are contained in Subpart J of Part 2 of this Chapter.

Section 15.103 Exempted devices.

The following devices are subject only to the general conditions of operation in Section 15.5 and are exempt from the specific technical standards and other requirements contained in this Part. The operator of the exempted device may be required to stop operating the device upon a finding that the device is causing harmful interference until the interference problem has been corrected. Although not mandatory, it is strongly recommended that the manufacturer of an exempted device endeavor to have his device meet the specific technical standards in this Part.

(a) A digital device utilized exclusively in any transportation vehicle including motor vehicles and aircraft.

(b) A digital device used exclusively as an electronic control or power system utilized by a public utility or in an industrial plant. The term public utility includes equipment only to the extent that it is in a dedicated building or large room owned or leased by the utility and does not extend to equipment installed in a subscriber's facility.

(c) A digital device used exclusively as industrial, commercial, or medical test equipment.

(d) A digital device utilized exclusively in an appliance, e.g., microwave oven, dishwasher, clothes dryer, air conditioner (central or window), etc.

(e) Specialized medical digital devices (generally used at the direction of or under the supervision of a licensed health care practitioner) whether used in a patient's home or a health care facility. Non-specialized medical devices marketed through retail channels for use by the general public are not exempted. This exemption also does not apply to digital devices used for record keeping or any purpose not directly connected with medical treatment.

(f) Musical greeting cards, quartz watches and clocks, modules of quartz watches and clocks, digital devices that have a power consumption not exceeding 6 nW, and battery powered hand-held calculators and electronic games not requiring connection to the AC power lines.

(g) Joystick controllers or similar devices, such as a mouse, used with digital devices but which contain only non-digital circuitry or a simple circuit to convert the signal to the format required (e.g., an integrated circuit for analog to digital conversion) are viewed as passive add-on devices, not themselves directly subject to the technical standards or the equipment authorization requirements.

Section 15.105 Information to the user.

(a) For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed on the first page of text of the manual:

WARNING: This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instruction manual, it may cause interference to radio communications. The rules with which it must comply afford reasonable protection against such interference when it is used in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user will be required to correct the interference at his own expense.

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed on the first page of text of the manual:

WARNING: This equipment generates and uses radio frequency energy. If not installed and used in accordance with the instruction manual, it can cause interference to radio communications. The rules with which it must comply afford reasonable protection against interference when used in most locations. However, there can be no guarantee that such interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

(c) The provisions of paragraphs (a) and (b) do not apply to digital devices exempted from the technical standards under the provisions of Section 15.103.

(d) For systems incorporating several digital devices, the statement shown in paragraph (a) or (b) needs to be contained only in the instruction manual for the main control unit.

Section 15.107 Conducted limits.

(a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility power line, the radio frequency voltage, as measured between each power line and ground at the power terminals, on any frequency or frequencies within the band of 450 kHz to 30 MHz that is conducted back into the power line shall not exceed 250 microvolts.

(b) Receivers subject to the provisions of this Part that are manufactured or imported prior to June 1, 1997, excluding TV broadcast receivers and CB receivers, may comply with the conducted limits shown below in lieu of paragraph (a) of this section:

Frequency of Emission (MHz)	Conducted Limit (microvolts)
0.45 - 9.0	250
9.0 - 10.0	250 - 1000*
10.0 - 30.0	1000

*linear interpolation

(c) For a Class A digital device that is designed to be connected to the public utility power line, the radio frequency voltage, as measured between each power line and ground at the power terminals, on any frequency or frequencies within the band of 450 kHz to 30 MHz that is conducted back into the power line shall not exceed the following:

Frequency of Emission (MHz)	Conducted Limit (microvolts)
0.45 - 1.705	1000
1.705 - 30.0	3000

(d) In the tables shown above, the tighter limit applies at the band edges.

(e) For non-radiating carrier current systems whose emissions are contained within the frequency range of 450 kHz to 30 MHz, the provisions of this Section shall not apply.

Section 15.109 Radiated emission limits.

(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of Emission (MHz)	Field Strength (microvolts/meter)
30 - 88	100
88 - 216	150
216 - 960	200
Above 960	500

(b) For CB receivers, the field strength of radiated emissions within the frequency range of 25 - 30 MHz shall not exceed 40 microvolts/meter at a distance of 3 meters. The field strength of radiated emissions above 30 MHz shall comply with the limits in paragraph (a).

(c) The field strength of radiated emissions, as determined at a distance of 30 meters, from a Class A digital device shall not exceed the following:

Frequency of Emission (MHz)	Field of Strength (microvolts/meter)
30 - 88	30
88 - 216	50
216 - 960	70
Above 960	100

(d) Non-radiating carrier current systems or other unintentional radiators that are designed to conduct their radio frequency emissions via connecting wires or cables and that operate in the frequency range of 9 kHz to 30 MHz, including devices that deliver the radio frequency energy to transducers, such as ultrasonic devices not covered under Part 18 of this Chapter, shall comply with the radiated emission limits shown in Section 15.209 for the frequency range of 9 kHz to 30 MHz. At frequencies above 30 MHz, the provisions of paragraph (a) of this

Section apply.

(e) Receivers subject to the provisions of this Part, except for CB receivers and receivers associated with a transmitter operating under the provisions for periodic operation above 70 MHz in Section 15.235, which are manufactured or imported prior to June 1, 1997, in lieu of paragraph (a) may comply with the average field strength limits for radiated emissions, as determined at a distance of 3 meters, shown below:

Frequency of Emission (MHz)	Field Strength (microvolts/meter)
30 - 70	320
70 - 130	500
130 - 174	500 - 1500*
174 - 260	1500
260 - 470	1500 - 5000*
Above 470	5000

*linear interpolation

(f) For television broadcast receivers manufactured or imported prior to June 1, 1997, the average field strength limit shown in paragraph (e) of this Section for the band of 470 - 960 MHz shall be 3500 microvolts/meter at 3 meters, compliance being determined as follows:

(1) Measurements shall be made at the following 10 frequencies in the band 470 - 960 MHz:

MHz	MHz	MHz
520	700	850
550	750	900
600	800	931
650		

Note: If measurements can not be made on one or more of the frequencies listed because of the presence of signals from licensed radio stations, measurements should be made on a nearby frequency. The report of measurements shall indicate the actual frequency(ies) on which measurements were made. If the receiver is not capable of receiving channels above 806 MHz, the measurements at 900 and 931 MHz may be omitted.

(2) The average of these measurements shall not exceed 3500 microvolts/meter. However, no measurement on any frequency shall exceed an average field strength of 7500 microvolts/meter at 3 meters.

(g) Receivers associated with a transmitter operating under the provisions for periodic operation above 70 MHz in Section 15.235 that are manufactured or imported prior to June 1, 1997, may comply with the field strength limits for radiated emissions, as determined at a distance of 3 meters, shown below:

(1) Emissions from these receivers shall not exceed the field strength limits shown in paragraph (a) of this Section in the following frequency bands:

MHz	MHz	GHz
73 - 75.4	608 - 614	10.68 - 10.7
108 - 118	960 - 1215	15.35 - 15.4
121.4 - 121.6	1400 - 1427	19.3 - 19.4
156.7 - 156.9	1535 - 1670	31.3 - 31.5
240 - 285	2690 - 2700	88 - 90
238.6 - 335.4	4200 - 4400	
404 - 406.2	4.99 - 5.25	

(2) All other emissions shall not exceed the average field strength limits shown below:

Frequency of Emission (MHz)	Field of Strength (microvolts/meter)
30 - 70	320
70 - 200	500
200 - 1500	500 - 5000*
Above 1500	5000

*linear interpolation

(3) The provisions of subparagraph (g)(1) shall not apply to receivers associated with a transmitter operating under the provisions of Section 15.235(d).

(h) In the emission tables above, the tighter limit applies at the band edges.

(i) The provisions contained in Section 15.111 are optional for receivers utilizing the provisions of paragraphs (e), (f) or (g) of this Section. Should the provisions of Section 15.111 not be employed, the receiver shall be tested with an antenna connected to the antenna terminals.

Section 15.111 Antenna conduction limits for receivers.

(a) In addition to the radiated emission limits, receivers that operate (tune) in the frequency range of 30 to 1000 MHz and CB receivers shall comply with the following: With the receiver antenna terminal connected to a resistive termination equal to the manufacturer's rated impedance, the available power at the antenna terminal at any frequency within the range of measurements specified in Section 15.33 shall not exceed 2.0 nanowatts. This requirement does not apply to a receiver provided only with a permanently attached antenna.

(b) CB receivers and receivers that operate (tune) in the frequency range of 30 to 1000 MHz that are provided only with a permanently attached antenna shall comply with the radiated emission limitations in this Part. They are not required to comply with the antenna terminal conducted limits of this Section.

Section 15.113 Power line carrier systems.

Power line carrier systems are subject to the following requirements; they are otherwise exempt from the provisions of this Part, including the equipment authorization requirements:

(a) A power utility operating a power line carrier system shall submit the details of all existing systems plus any proposed new systems or changes to existing systems to an industry-operated entity as set forth in Section 90.63(g) of this Chapter. No notification to the FCC is required.

(b) The operating parameters of a power line carrier system (particularly the frequency) shall be selected to achieve the highest practical degree of compatibility with authorized or licensed users of the radio spectrum. The signals from this operation shall be contained within the frequency band of 9 kHz to 490 kHz. A power line carrier system shall operate on an unprotected, non-interference basis in accordance with Section 15.5 of this Part. If harmful interference occurs, the electric power utility shall discontinue use or adjust its power line carrier operation, as required, to remedy the interference.

(c) Power line carrier system apparatus shall be operated with the minimum power possible to accomplish the desired purpose.

(d) The best engineering principles shall be utilized in the generation of radio frequency currents by power line carrier systems so as to guard against interference to authorized radio users, particularly on the fundamental and harmonic frequencies.

(e) Power line carrier system apparatus shall conform to such engineering standards as may be promulgated by the Commission. In addition, such systems should adhere to industry approved standards designed to enhance the use of power line carrier systems.

(f) These provisions for power line carrier systems, as defined in Section 15.3(t), apply only to systems operated by a power utility. Other kinds of carrier current systems are excluded from these provisions.

Section 15.115 TV interface devices and cable terminal devices.

(a) A cable terminal or TV interface device shall be equipped with a receiver transfer switch for connecting the antenna terminals of a receiver selectively either to the receiving antenna or to the radio frequency output of the cable terminal or TV interface device. In either position of the receiver transfer switch, the maximum voltage at the receiving antenna input terminals of the switch when terminated with a resistance (R ohms) matching the rated impedance of the antenna input of the switch shall not exceed $0.346(\text{square root of } R)$ microvolts. This measurement shall be determined using a connecting cable, where required, between the cable terminal or TV interface device and the transfer switch of the type and length 1) provided with the cable terminal or TV interface device, 2) recommended in the instruction manual, or 3) normally

employed by the consumer. For video signals, the maximum voltage shall correspond to the peak envelope power of the video modulated signal during maximum amplitude peaks. For non-video signals, the maximum voltage shall correspond to the peak envelope power of the modulated signal. The cable terminal or TV interface device shall be designed and constructed to the extent practicable so as to preclude the possibility that the consumer may inadvertently attach the output of the device directly to the receiving antenna, if any, without first going through the transfer switch.

(1) A physical transfer switch is not required for a cable terminal or TV interface device that has an antenna input terminal(s) provided the maximum voltage appearing at the terminal(s) does not exceed the limit in paragraph (a) and the circuitry following the antenna input terminal(s) has sufficient bandwidth to allow the reception of all TV broadcast channels authorized under this Chapter.

(2) A transfer switch is not required for a cable terminal or TV interface device that, when connected, results in the user no longer having any need to receive standard over-the-air broadcast signals via a separate antenna.

(b) If a transfer switch is not required, the following label shall be used in addition to the labels shown in Sections 15.19 or 15.25:

This device is intended to be attached to a receiver that does not receive over-the-air broadcast signals. Connection of this device in any other fashion may cause harmful interference to radio communications and is in violation of the FCC Rules, Part 15.

(c) An external, stand-alone transfer switch intended for use with a TV interface or cable terminal device shall comply with the technical provisions in paragraph (a) of this Section. Compliance of stand-alone switches with these standards shall be considered satisfactory if the switch isolation exceeds 60 dB.

(d) A TV interface device and a cable terminal device shall incorporate circuitry to automatically prevent emanations from the device from exceeding the technical specifications in this Part. These circuits shall be adequate to accomplish their functions when the TV interface device or cable terminal device is presented with video input signal levels in the range of one to five volts. This requirement is not applicable to a TV interface device that incorporates a built-in signal source and has no provisions for the connection of an external signal source.

(e) Measurements of radiated emissions shall be performed with the output terminal of the device terminated by a resistance equal to the rated output impedance.

(f) The emanations of a TV interface device incorporating an intentional radiator shall not exceed the limits in Section 15.109 or Subpart C of this Part, whichever is higher for each frequency. Where it is possible to determine which portion of the device is contributing a particular radio frequency emission, the emissions from the TV interface device portion shall comply with the emission limits in Section 15.109, and the emissions from the intentional radiator shall comply with Subpart C of this Part.

(g) A TV interface device or cable terminal device incorporating a TV broadcast tuner shall meet the all channel requirements in Section 15.117.

(h) An external device or accessory that is intended to be attached to a TV interface or cable terminal device shall comply with the technical and administrative requirements set out in the rules under which it operates. For example, a personal computer must be certificated to show compliance with the digital device regulations. An external device or accessory that is not otherwise subject to separate Commission regulations shall comply with those regulations applicable to a TV interface or cable terminal device. For example, a video distribution system that is connected to a TV interface device to allow the program to be supplied by wire or cable to multiple receivers would be certificated under the TV interface device regulations. This latter provision does not include passive devices such as non-amplified signal splitters.

Section 15.117 TV broadcast receivers.

(a) All TV broadcast receivers shipped in interstate commerce or imported from any foreign country into the United States, for sale or resale to the public, shall comply with the provisions of this Section.

(b) TV broadcast receivers shall be capable of adequately receiving all channels allocated by the Commission to the television broadcast service.

(c) On a given receiver, use of the UHF and VHF tuning systems shall provide approximately the same degree of tuning accuracy with approximately the same expenditure of time and effort: *Provided, however*, that this requirement will be considered to be met if the need for routine fine tuning is eliminated on UHF channels.

(1) *Basic tuning mechanism.* If a TV broadcast receiver is equipped to provide for repeated access to VHF television channels at discrete tuning positions, that receiver shall be equipped to provide for repeated access to a minimum of six UHF television channels at discrete tuning positions. Unless a discrete tuning position is provided for each channel allocated to UHF television, each position shall be readily adjustable to a particular UHF channel by the user without the use of tools. If 12 or fewer discrete tuning positions are provided, each position shall be adjustable to receive any channel allocated to UHF television.

Note: The combination of detented rotary switch and pushbutton controls is acceptable, provided UHF channels, after their initial selection, can be accurately tuned with an expenditure of time and effort approximately the same as that used in accurately tuning VHF channels. A UHF tuning system comprising five pushbuttons and a separate manual tuning knob is considered to provide repeated access to six channels at discrete tuning positions. A one-knob (VHF/UHF) tuning system providing repeated access to 11 or more discrete tuning positions is also acceptable, provided each of the tuning positions is readily adjustable, without the use of tools, to receive any UHF channel.

(2) *Tuning controls and channel readout.* UHF tuning controls and channel readout on a given receiver shall be comparable in size, location, accessibility and legibility to VHF controls and readout on that receiver.

Note: Differences between UHF and VHF channel readout that follow directly from the larger number of UHF television channels available are acceptable if it is clear that a good faith effort to comply with the provisions of this Section has been made.

(d) If equipment and controls that tend to simplify, expedite or perfect the reception of television signals (*e.g.*, AFC, visual aids, remote control, or signal seeking capability referred to generally as tuning aids) are incorporated into the VHF portion of a TV broadcast receiver, tuning aids of the same type and comparable capability and quality shall be provided for the UHF portion of that receiver.

(e) If a television receiver has an antenna affixed to the VHF antenna terminals, it must have an antenna designed for and capable of receiving all UHF television channels affixed to the UHF antenna terminals. If a VHF antenna is provided with but not affixed to a receiver, a UHF antenna shall be provided with the receiver.

(f) The picture sensitivity of a TV broadcast receiver averaged for all channels between 14 and 69 inclusive shall not be more than 8 dB larger than the peak picture sensitivity of that receiver averaged for all channels between 2 and 13 inclusive.

(g) The noise figure for any television channel 14 to 69 inclusive shall not exceed 14 dB. A TV receiver model is considered to comply with this noise figure if the maximum noise figure for channels 14-69 inclusive of 97.5 percent of all receivers within that model does not exceed 14 dB.

(1) The manufacturer shall measure the noise figure of a number of UHF channels of the test sample to give reasonable assurance that the UHF noise figure for each channel complies with the above limit.

(2) The manufacturer shall insert in his files a statement explaining the basis on which he will rely to ensure that at least 97.5 percent of all production units of the test sample that are manufactured have a noise figure of no greater than 14 dB.

(3) Within one year after a specific TV receiver model has been verified for compliance, the manufacturer shall file a report with the Commission giving the actual UHF noise figure performance of units of that model actually measured during that year. The report, as an alternative, may be filed by the party responsible for the marketing of that model TV broadcast receiver within this country.

(4) In the case of a TV tuner built-in as part of a video tape recorder that uses a power splitter between the antenna terminals of the video tape recorder and the input terminals of the TV tuner, 4 dB may be subtracted from the noise figure measured at the antenna terminals of the video tape recorder for determining compliance of such a built-in TV tuner with the 14 dB noise figure limit.

Subpart C - Intentional Radiators

Section 15.201 Equipment authorization requirement.

(a) Intentional radiators operated as carrier current systems and devices operated under the provisions of Sections 15.213 and 15.221 shall be verified pursuant to the procedures in Subpart J of Part 2 of this Chapter prior to marketing.

(b) Except as otherwise exempted in Section 15.23, all other intentional radiators operating under the provisions of this Part shall be certificated by this Commission pursuant to the procedures in Subpart J of Part 2 of this Chapter prior to marketing.

Section 15.203 Antenna requirement.

An intentional radiator shall be designed in such a manner as to ensure that no antenna other than that furnished by the manufacturer shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.213, 15.217, 15.219, 15.221, or 15.247.

Section 15.205 Restricted bands of operation.

(a) Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
MHz	MHz	MHz	GHz
0.49-0.51	164.43-164.72	2483.5-2500	9.3-9.5
2.1735-2.1905	166.73-167.17	2655-2900	10.6-12.7
8.362-8.366	240-285	3260-3267	13.25-13.4
13.36-13.41	322-335.4	3332-3339	14.47-14.5
25.5-25.67	399.9-410	3345.8-3358	15.35-16.2
37.5-38.25	608-614	3600-4400	17.7-21.4
73-75.4	960-1240	4500-525	22.01-23.12
108-121.94	1300-1427	5350-5460	23.6-24.0
123-123.2	1530-1626.5	7250-7750	31.2-31.8
123.58-138	1660-1710	8025-8500	36.43-36.5
149.9-150.05	2200-2300	9000-9200	above 38.6
156.7			

(b) The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209.

(c) Regardless of the field strength limits specified elsewhere in this Subpart, the provisions of this Section apply to emissions from any intentional radiator.

Section 15.207 Conducted limits.

(a) For an intentional radiator which is designed to be connected to the public utility power line, the radio frequency voltage, as measured between each power line and ground at the power terminals, on any frequency or frequencies within the band of 450 kHz to 30 MHz which is conducted back into the power line shall not exceed 250 microvolts.

(b) The limit in paragraph (a) shall not apply to an intentional radiator operated as a carrier current system in the frequency range of 450 kHz to 30 MHz.

Section 15.209 Radiated emission limits, general requirements.

(a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Fundamental Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

(b) The tighter limit applies at the band edges.

(c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the limits in paragraph (a). The limits are based on the frequency of the emission.

Section 15.211 Use of multiple intentional radiators.

Except for biomedical telemetering devices, the use of multiple intentional radiators for the purpose of extending transmission range or for increasing the area of coverage is prohibited. The use of multiple biomedical telemetering devices to extend transmission range is restricted to a localized area such as a hospital or residence.

Section 15.213 Tunnel radio systems.

An intentional radiator utilized as part of a tunnel radio system may operate on any frequency provided it meets all of the following conditions:

(a) Operation of a tunnel radio system (intentional radiator and all connecting wires, excluding an outside system used to receive signals rebroadcast within the tunnel) shall be contained solely within a tunnel, mine or other structure that provides attenuation to the radiated signal due to the presence of naturally surrounding earth and/or water.

(b) Any receiving system external to the tunnel, mine or other structure, as described, shall be subject to the regulations applicable to unintentional radiators.

(c) The total electromagnetic field on any frequency or frequencies appearing outside of the tunnel, mine or other structure shown in paragraph (a) shall not exceed the limits shown in Section 15.209. Particular attention shall be paid to the emissions from any opening in the structure to the outside environment.

(d) The conducted limits in Section 15.207 apply to the radio frequency voltage on the public utility power lines outside of the tunnel.

(e) A grant of equipment authorization is not required for a tunnel radio system. In lieu thereof, a tunnel radio system shall be verified for compliance with the regulations.

(f) The provisions of Section 15.5 apply to any tunnel radio system operated under this Section.

Radiated Emission Limits, Additional Provisions

Section 15.215 Additional provisions to the general radiated emission limitations.

(a) The regulations subsequent to this Section provide alternatives to the general radiated emission limitations for specified frequency bands. Emissions from intentional radiators operating within those specified frequency bands shall comply with either the specified standards or the general radiated emission standards in

Section 15.209. In most cases, unwanted emissions outside of the frequency bands shown in these alternative provisions must be attenuated to the emission limits shown in Section 15.209. In no case shall the level of the unwanted emissions from an intentional radiator operating under these additional provisions exceed the field strength of the fundamental emission.

(b) For those alternative radiated emission limitations which are applied to a band of frequencies and for which a frequency stability is not specified, it is recommended that the carrier frequency be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Section 15.217 Operation in the band 160 - 190 kHz.

(a) The total input power to the final radio frequency stage (exclusive of filament or heater power) shall not exceed one watt.

(b) The total length of the transmission line, antenna, and ground lead (if used) shall not exceed 15 meters.

(c) All emissions below 160 kHz or above 190 kHz shall be attenuated at least 20 dB below the level of the unmodulated carrier.

Section 15.219 Operation in the band 510 - 1705 kHz.

(a) The total input power to the final radio frequency stage (exclusive of filament or heater power) shall not exceed 100 milliwatts.

(b) The total length of the transmission line, antenna and ground lead (if used) shall not exceed 3 meters.

(c) All emissions below 510 kHz or above 1705 kHz shall be attenuated at least 20 dB below the level of the unmodulated carrier.

Section 15.221 Operation in the band 535 - 1705 kHz.

(a) The provisions of this Section are restricted to the operation of an AM broadcast station on a college or university campus or on the campus of any other educational institution. Operation is restricted to the grounds of the campus. Operation is permitted on any unused frequency in the above band.

(b) On the campus, the field strength of emissions appearing outside of this frequency band shall not exceed the general radiated emission limits shown in Section 15.209 as measured from the radiating source. There is no limit on the field strength of emissions appearing within this frequency band except that the provisions of Section 15.5 continue to apply.

(c) At the perimeter of the campus, the field strength of any emissions shall not exceed the general radiated emission limits shown in Section 15.209.

(d) The conducted limits specified in Section 15.207 apply to the radio frequency voltage on the public utility power lines outside of the campus. However, if a carrier current system is employed, the provisions of Section 15.207 do not apply.

(e) A grant of equipment authorization is not required for a campus radio system. In lieu thereof, a campus radio system shall be verified for compliance with the regulations in accordance with Subpart J of Part 2 of this Chapter. This data shall be kept on file at the location of the campus radio transmitting equipment.

Section 15.223 Operation in the band 1.705 - 10 MHz.

(a) The field strength of any emission within the band of 1.705-10.0 MHz shall not exceed 100 microvolts/meter at a distance of 30 meters. However, if the bandwidth of the emission is less than ten percent of the center frequency, the field strength may not exceed 30 microvolts/meter or (the bandwidth of the device in kHz)/(the center frequency of the device in MHz) microvolts/meter at a distance of 30 meters, whichever is the higher level. For the purposes of this Section, bandwidth is determined at the points 6 dB down from the modulated carrier.

(b) The field strength of emissions outside of the band of 1.705-10.0 MHz shall not exceed the general radiated emission limits in Section 15.209.

Section 15.225 Operation within the band 13.553 - 13.567 MHz.

(a) The field strength of any emissions within this band shall not exceed 10,000 microvolts/meter at 30 meters.

(b) The field strength of any emissions appearing outside of this band shall not exceed the general radiated emission limits shown in Section 15.209.

(c) The frequency tolerance of the carrier signal shall be maintained within +0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the variation in supply voltage shall be from the battery operating end point to the voltage of new battery.

Section 15.227 Operation within the band 26.96 - 27.28 MHz.

(a) The field strength of any emission within this band shall not exceed 10,000 microvolts/meter at 3 meters.

(b) The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in Section 15.209.

(c) As an alternative to the provisions of paragraphs (a) and (b) of this Section, an intentional radiator manufactured or imported prior to June 1, 1997, may be operated within this frequency band under the following conditions.

(1) The device shall operate on the following frequencies:

MHz	MHz
26.995	27.145
27.045	27.195
27.095	27.225

(2) Operation is permitted on only one frequency at a time. Simultaneous operation on multiple frequencies or other multiple frequency use, such as frequency hopping, is not permitted under this paragraph. Any method of modulation is acceptable, except intentional radiators operating under the provisions of this paragraph shall not be used for voice or for continuous wave (CW) communications.

(3) The frequency tolerance of the carrier signal shall be maintained within +0.01% of the operating frequency over a temperature variation of -20 to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the variation in supply voltage shall be from the battery operating end point to the voltage of a new battery.

(4) The emission shall be confined with a 20 kHz band centered on a frequency shown in subparagraph (d)(1). The emission of RF energy within this 20 kHz band shall not exceed 10,000 microvolts/meter, as determined at a distance of 3 meters, on any frequency or frequencies.

(5) Unwanted emissions occurring on any frequency more than 10 kHz removed from a frequency shown in subparagraph (d)(1) shall not exceed 500 microvolts/meter as determined at a distance of 3 meters. The spectrum shall be scanned from 10 MHz to 1000 MHz and all emissions exceeding 50 microvolts/meter at 3 meters shall be reported in the application for certification.

Section 15.229 Operation within the band 40.66 - 40.70 MHz.

(a) The field strength of any emissions within this band shall not exceed 1000 microvolts/meter at 3 meters.

(b) The field strength of any emissions appearing outside of this band shall not exceed the general radiated emission limits in Section 15.209.

(c) The frequency tolerance of the carrier signal shall be maintained within +0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the variation in supply voltage shall be from the battery operating end point to the voltage of a new battery.

Section 15.231 Operation within the bands 46.60 - 46.98 MHz and 49.66 - 50.0 MHz.

(a) The provisions shown in this Section are restricted to cordless telephones. The manufacture and importation of a cordless telephone subject to the provisions of this Section shall cease February 15, 1989. The marketing of these devices shall cease February 15, 1990. [Note: these dates are currently under consideration by the Commission and will be addressed in a separate rule making action. The provisions shown in this Section do not consider these dates.]

(b) An intentional radiator used as part of a cordless telephone system shall operate on one or more of the following ten carrier frequency pairs:

Channel	Base Transmitter (MHz)	Handset Transmitter (MHz)
1	46.610	49.670
2	46.630	49.845
3	46.670	49.860
4	46.710	49.770
5	46.730	49.875
6	46.770	49.830
7	46.830	49.890
8	46.870	49.930
9	46.930	49.990
10	46.970	49.970

(c) The field strength of the carrier frequency shall not exceed 10,000 microvolts/meter at 3 meters.

(d) Emissions shall be confined within a 20 kHz band centered on a carrier frequency shown in paragraph (b). Emissions on any frequency more than 10 kHz removed from the carrier frequency shall not exceed the general radiated emission limits in Section 15.209.

(e) Equipment manufactured or imported prior to June 1, 1997, may be designed to comply with the following emission limits:

(1) Emissions removed from the carrier frequency by 10 kHz to 20 kHz shall be attenuated at least 26 decibels below the unmodulated carrier.

(2) Emissions removed from the carrier frequency by more than 20 kHz shall not exceed the general radiated emission limits shown in Section 15.209.

(f) All emissions exceeding 20 microvolts/meter at 3 meters are to be reported in the application for certification. Tests to determine compliance with this requirement shall be performed using an appropriate input signal as prescribed in Section 2.989 of this Chapter.

(g) If the device provides for the connection of external accessories, including external electrical input signals, the device must be tested with the accessories attached. The emission tests shall be performed with the device and accessories configured in a manner which tends to produce maximized emissions within the range of variations that can be expected under normal operating conditions.

(h) The frequency tolerance of the carrier signal shall be maintained within +0.01% of the operating frequency. The tolerance shall be maintained for a temperature variation of -20 degrees C to +50 degrees C at normal supply voltage, and for variation in the primary voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the variation in supply voltage shall be from the battery operating end point to the voltage of a new battery.

(i) For equipment authorization, a single application form, FCC Form 731, for certification and notification may be filed for a cordless telephone system, provided the application clearly identifies and provides data for all parts of the system to show compliance with the applicable technical requirements. When a single application form is submitted, both the base station and the portable handset must carry the same FCC identifier. The application shall include a fee for certification of each type of transmitter and for notification (or certification, if appropriate) for each type of receiver included in the system.

(j) A cordless telephone which is intended to be connected to the public telephone network shall also comply with the applicable regulations in Part 68 of this Chapter. A separate application for registration under Part 68 is required.

(k) The label required under Subpart A shall also contain the following statement: "Privacy of communications may not be ensured when using this phone".

(l) The box or other package in which the individual cordless telephone is to be marketed shall carry a statement in a prominent location, visible to the buyer before purchase, which reads as follows:

NOTICE: The base units of some cordless telephones may respond to other nearby units or to radio noise resulting in telephone calls being dialed through this unit without your knowledge and possibly calls being misbilled. In order to protect against such occurrences, this cordless telephone is provided with the following features: (to be completed by the manufacturer).

An application for certification of a cordless telephone shall specify the complete text of the statement that will be carried on the package and indicate where, specifically, it will be located on the carton.

Section 15.233 Operation within the band 49.82 - 49.90 MHz.

(a) The field strength of any emission within this band shall not exceed 10,000 microvolts/meter at 3 meters.

(b) The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in Section 15.209. All signals exceeding 20 microvolts/meter at 3 meters shall be reported in the application for certification.

(c) Cordless telephones are not permitted to operate under the provisions of this Section.

(d) As an alternative to the provisions of paragraphs (a), and (b) of this Section, an intentional radiator manufactured or imported prior to June 1, 1997, may be operated within this frequency band under the following conditions:

(1) The device shall operate on the following frequencies:

MHz	MHz
49.830	49.875
49.845	49.890
49.860	

(2) The frequency tolerance of the carrier signal shall be maintained with +0.01% of the operating frequency over a temperature variation of -20 to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the variation in supply voltage shall be from the battery operating end point to the voltage of a new battery.

(3) The emission shall be confined within a 20 kHz band centered on a frequency shown in subparagraph (d)(1). The emission of RF energy within this 20 kHz band shall not exceed 10,000 microvolts/meter, as determined at a distance of 3 meters, on any frequency or frequencies.

(4) Unwanted emissions occurring on any frequency more than 10 kHz removed from a frequency shown in subparagraph (d)(1) shall not exceed 500 microvolts/meter

as determined at a distance of 3 meters. The spectrum shall be scanned in accordance with Section 15.33 and all emissions exceeding 20 microvolts/meter at 3 meters shall be reported in the application for certification.

(e) For a home-built intentional radiator, as defined in Section 15.3(m), operating within the band 49.82-49.90 MHz, the following standards may be employed:

(1) The RF carrier and modulation products shall be maintained within the band 49.82-49.90 MHz.

(2) The total input power to the device measured at the battery or the power line terminals shall not exceed 100 milliwatts under any condition of modulation.

(3) The antenna shall be a single element, one meter or less in length, permanently mounted on the enclosure containing the device.

(4) Emissions outside of this band shall be suppressed at least 20 dB below the level of the unmodulated carrier.

(5) The regulations contained in Section 15.23 of this Part apply to intentional radiators constructed under the provisions of this paragraph.

Section 15.235 Periodic operation above 70 MHz.

(a) The provisions of this Section are restricted to periodic operation above 70 MHz. Except as shown in paragraph (d) of this Section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Radio control of toys is not permitted. Continuous transmissions, such as voice or video, and data transmissions are not permitted. The prohibition against data transmissions does not preclude the use of recognition codes. Those codes are used to identify the sensor that is activated or to identify the particular component as being part of the system. The following conditions shall be met to comply with the provisions for this periodic operation:

(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than seconds of being released.

(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

(3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions to determine system integrity of transmitters used in security or safety applications are allowed if the periodic rate of transmission does not exceed one transmission of not more than one second duration per hour for each transmitter.

(4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.

(b) Notwithstanding the provisions of Section 15.205, the field strength of emissions from intentional radiators operated under this Section shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
70 - 88	1,250	100
88 - 130	1,250	150
130 - 174	1,250 to 3,750 **	150 to 375 **
174 - 260	3,750	375
260 - 470	3,750 to 12,500 **	375 to 1,250 **
Above 470	12,500	1,250

** linear interpolations

(1) The above field strength limits are specified at a distance of 3 meters.

(2) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the limit shown in this table or to the general limits shown in Section 15.209, whichever is the lesser attenuation. The limits shown in Section 15.209 are based on the frequency of the emission.

(3) Intentional radiators operating under the provisions of this Section shall demonstrate compliance with the limits on the field strength of emissions based on the average value of the measured emissions or, as an alternative, shall employ the measurement procedures specified in Section 15.35. The specific method of measurement shall be specified in any application submitted for equipment authorization. If average emission measurements are employed, the following conditions apply:

(i) For pulsed operation, the measured field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. In those cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the averaged absolute voltage during 0.1 second interval when the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for equipment authorization.

(ii) The peak field strength of any emission shall not exceed a value 20 dB above the limits specified in paragraph (b) under any condition of modulation.

(iii) Compliance with the provisions of Section 15.205 shall be determined using the measurement procedure specified in Section 15.35.

(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operated above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

(d) Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) and may be employed for any type of operation, including the restrictions listed in paragraph (a), provided the following conditions are met:

(1) The allowable emission levels specified in paragraph (b) and its subparagraphs are reduced by 8 dB, except that the field strength of unwanted emissions do not need to be reduced below the general radiated emission limits, as shown in Section 15.209. The spurious emission limits in paragraph (b) are based on the fundamental frequency of the intentional radiator, and the emission limits in Section 15.209 are based on the frequency of the emission;

(2) The bandwidth limitations in paragraph (c) are met;

(3) The peak field strength of any emission does not exceed the limits specified in paragraph (b), as reduced in accordance with subparagraph (d)(1), by greater than 20 dB; and,

(4) The device is provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the transmission duration but in no case less than 10 seconds.

Section 15.237 Operation in the bands 72.0 - 73.0 MHz and 75.4 - 76.0 MHz.

(a) The intentional radiator shall be restricted to use as an auditory assistance device.

(b) The field strength of the unmodulated carrier signal shall not exceed 80 millivolts/meter at 3 meters.

(c) The maximum bandwidth shall not exceed 200 kHz and that 200 kHz band shall be contained totally within the bands of 72.0-73.0 MHz or 75.4-76.0 MHz.

(d) The field strength of any emissions removed more than 100 kHz from the center frequency shall not exceed 1500 microvolts/meter at 3 meters.

Section 15.239 Operation in the band 88 - 108 MHz.

(a) Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88-108 MHz.

(b) The field strength of any emissions within the permitted 200 kHz band shall not exceed 250 microvolts/meter at 3 meters.

(c) The field strength of any emissions radiated on any frequency outside of the specified 200 kHz band shall not exceed the general radiated emission limits in Section 15.209.

Section 15.241 Operation in the band 174 - 216 MHz.

(a) Operation under the provisions of this Section is restricted to biomedical telemetering devices.

(b) Emissions from the device shall be confined within a 200 kHz band which shall lie wholly within the frequency range of 174-216 MHz.

(c) The field strength of any emissions radiated within the specified 200 kHz band shall not exceed 1500 microvolts/meter at 3 meters.

(d) The field strength of emissions radiated on any frequency outside of the specified 200 kHz band shall not exceed the general radiated emission limits in Section 15.209.

Section 15.243 Operation in the band 890 - 940 MHz.

(a) Operation under the provisions of this Section is restricted to devices that use radio frequency energy to measure the characteristics of a material. Devices operated pursuant to the provisions of this Section shall not be used for voice communications or the transmission of any other type of message.

(b) The field strength of any emissions radiated within the specified frequency band shall not exceed 500 microvolts/meter at 30 meters. The field strength of emissions radiated on any frequency outside of the specified band shall not exceed the general radiated emission limits in Section 15.209.

(c) The device shall be self-contained with no external or readily accessible controls which may be adjusted to permit operation in a manner inconsistent with the provisions in this Section. Any antenna that may be used with the device shall be permanently attached thereto and shall not be readily modifiable by the user.

Section 15.245 Operation within the bands 902 - 928 MHz, 2435 - 2465 MHz, 5785 - 5815 MHz, 10500 - 10550 MHz, and 24075 - 24175 MHz.

(a) Operation under the provisions of this Section is limited to intentional radiators used as field disturbance sensors.

(b) The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (millivolts/meter)
902 - 928	500	1.6
2435 - 2465	500	1.6
5785 - 5815	500	1.6
10500 - 10550	2500	25.0
24075 - 24175	2500	25.0

(1) Field strength limits are specified at a distance of 3 meters.

(2) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Section 15.247 Operation within the bands 902 - 928 MHz, 2400 - 2483.5 , and - 5850 MHz.

(a) Operation under the provisions of this Section is limited to frequency hopping and direct sequence spread spectrum intentional radiators that comply with the following provisions:

(1) For frequency hopping systems, at least 75 hopping frequencies, separated by at least 25 kHz, shall be used. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period. The maximum 20 dB bandwidth of the hopping channel is 25 kHz.

(2) For direct sequence systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

(b) The maximum peak output power of the intentional radiator shall not exceed one watt.

(c) Radio frequency output power outside these frequency bands over any 100 kHz bandwidth shall be 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power.

(d) The operation of a spread spectrum intentional radiator under the provisions of this Section is contingent on the use of a spread spectrum system that utilizes a receiver designed both to receive all of the transmitted energy and to perform the appropriate gain processing of the received signal.

Section 15.249 Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5875 MHz, and 24.0 - 24.25 GHz.

(a) The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 - 928 MHz	50	500
2400 - 2483.5 MHz	50	500
5725 - 5875 MHz	50	500
24.0 - 24.25 GHz	250	2500

(b) Field strength limits are specified at a distance of meters.

(c) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

FOOTNOTES

¹ See RM-5193 on video transmitters in the 902-928 MHz band, RM-5250 regarding improvement in the AM broadcasting service, and RM-5575 concerning TV interface devices.

² The limit applied to these early devices was .15 microvolts/meter (uV/m) at a distance equivalent to the wavelength of the operating frequency divided by 2 Pi. This limit is currently shown in Section 15.7.

³ The Commission is tasked under Sections 302 and 303 of the Communications Act of 1934, as amended, to establish regulations necessary to prevent harmful interference to the authorized radio services.

⁴ The Commission has traditionally attempted to keep emissions from all Part 15 devices to the minimum level necessary for operation. Furthermore, the Commission has expressed its desire to minimize the level of interference received by the authorized radio services. See, for example, "Report on the Status of the AM Broadcast Rules", Federal Communications Commission, April 3, 1986.

⁵ In most instances, we propose a period of ten years for devices to come into compliance with the new standards. We believe that this should provide sufficient time to redesign equipment within manufacturers' normal redesign.

⁶ Another category of devices addressed under Part 15 is incidental radiators. These are devices that do not intentionally incorporate the generation of radio frequency energy in their design but generate RF energy as a by-product of their operation. Examples include electric motors, light dimmers, and certain home appliances. In this proceeding, we are not proposing any standards for such devices with the exception that these devices operate on a non-interference basis.

⁷ See 47 CFR 15.4(f), (j), (k), (l).

⁸ See 47 CFR 15.4(n).

⁹ See 47 CFR 15.61

¹⁰ The energy conducted back into the power line can radiate from the power line. This type of interference usually occurs in the spectrum below 30 MHz. Limits on the amount of RF energy conducted back into the power line protects services such as AM broadcasting, amateur radio, and public safety.

¹¹ The dividing line between the 1000 uV and 3000 uV conducted limits is proposed to be changed from 1.6 MHz to 1.705 MHz to reflect the projected expansion of the AM broadcasting service.

¹² The proposals contained in the paragraphs concerning the "Detector Functions of Measuring Instruments" as well as the proposed regulations concerning "Measurement procedures" and "Emission limits" will affect these proposed field strength limits.

¹³ See "Technical Subcommittee (TSC) Review of The Federal Communications Commission's Draft Notice of Proposed Rule Making in the matter of Revision of Parts 2 and 15 of the Rules Regarding the Operation of Non-Licensed Radio Frequency Devices", National Telecommunications and Information Administration, U. S. Department of Commerce, November 5, 1986. It should be noted that this report recommends lower emission limits in the frequency bands below 960 MHz than the limits proposed in this Notice. A copy of this report will be placed in the docket file for this proceeding.

¹⁴ Under the current regulations, restricted bands apply to control and security alarm devices operating under the provisions of Sections 15.181-15.187 and 15.201-15.215 of the regulations, 47 CFR 15.181-15.187, 15.201-15.215. As these regulations are the only ones that permit large numbers of consumer devices within the frequency bands allocated to the U.S. Government without control as to the exact frequency location, it was necessary to restrict the operating frequencies in order to avoid interference to certain sensitive operations.

¹⁵ See the reference in footnote 13. The NTIA report recommends lower emission limits in the restricted bands than those proposed in this Notice.

¹⁶ Under Sections 302 and 303 of the Communications Act of 1934, as amended, the Commission is tasked to establish regulations necessary to prevent harmful interference to the authorized radio services. In order to carry out this obligation, the Commission has attempted to keep emissions from all Part 15 devices to the minimum level practicable or necessary for operation.

¹⁷ These limits are identical to the field strength limits proposed for intentional radiators above 30 MHz. We see no justification as to why unintentional radiators, primarily receivers, should be allowed to continue to operate at a higher field strength limit than what is proposed for intentional radiators, especially since unintentional radiators tend to be left on, and emitting radio frequency signals, for longer periods of time than intentional radiators.

¹⁸ See 47 CFR 15.59. CB receivers employing antenna terminals are required to meet a conducted limit at those terminals of 0.2 nW.

¹⁹ Presently, Subpart C of Part 15 specifies emission limits only for CB receivers and receivers that operate (tune) within the frequency ranges of 30-901 MHz and 935-940 MHz.

²⁰ Home satellite receivers usually downconvert the received frequency to an intermediate frequency above 900 MHz. The increasing popularity of such receivers has caused a rapid increase in their proliferation, thereby increasing their potential for causing interference, particularly to the aeronautical radionavigation services.

²¹ On May 13, 1987, the Commission released a Public Notice deleting the requirement to file FCC Form 740 for musical greeting cards, quartz watches and clocks, modules of quartz watches and clocks, and battery powered hand-held calculators and electronic games not requiring connection to the AC power lines. This Notice proposes to detail these exemptions in the regulations.

²² See *Order Granting Limited Waiver*, adopted April 23, 1985, released April 26, 1985, FCC 85-204, in response to RM-4840.

Before the
Federal Communications Commission
Washington, D.C. 20554

NEWS RELEASE

Released: October 2, 1987

SUMMARY OF PROPOSED CHANGES TO PART 15 OF THE REGULATIONS

On September 17, 1987, in Gen. Docket No. 87-389, FCC 87-300 the Commission adopted a Notice of Proposed Rule Making to amend Part 15 of its regulations. Due to the extent of the revisions to the regulations proposed in this item, the attached appendices are issued to allow manufacturers and consumers to rapidly determine specific areas of this proposal that may affect them. Appendix A contains a brief summary of the proposed changes. Appendix B shows the existing transmitter regulations and compares those regulations to the proposed changes, based on the frequency of the transmitter. Appendix C provides the same comparison for receivers. Appendix D contains a list of the proposed restricted frequency bands and the allocated radio service that is being protected.

Any questions regarding the proposals in this rule making action should be directed to Mr. John Reed, Room 7122, Technical Standards Branch, FCC, Washington, D. C. 20554, (202) 653-6288.

This is an unofficial announcement of the Commission's action. Release of the full text of the Commission's order constitutes official action. See *MCI v. FCC*, 515 F. 2d 385 (D. C. Circ. 1975).

APPENDIX A Summary of Proposed Changes

General:

- Marketing regulations for verified equipment and computing devices are proposed to be clarified
- All of the equipment authorization procedures would be contained in Part 2 (currently, some of the certification procedures are in Part 15)
- Only one FCC identifier number would be required for equipment containing multiple devices
- FCC Form 740 (importation) would no longer be required for devices with a power consumption of less than 6 nW, musical greeting cards, quartz watches and clocks, modules of quartz watches and clocks, and battery operated hand-held calculators (including some low clock rate personal computers and peripherals) and electronic games not requiring connection to the AC power lines
- A special temporary authorization or experimental license would no longer be required for testing devices to determine compliance with the regulations
- The technical standards pertaining to measurements to determine compliance would be contained in the regulations instead of in the measurement procedure bulletins

- With certain exceptions, field strength limits and conducted emission limits below 1000 MHz would be specified using a CISPR quasi-peak detector, and emission limits above 1000 MHz would be specified in peak values

- All kits are proposed to be subject to the regulations, including the equipment authorization procedures

- Verification of compliance or a grant of equipment authorization would be required for all Part 15 devices except: incidental radiators, home built devices that are not marketed (excluding kits), power line carrier systems, subassemblies, and certain exempted digital devices

- Labelling would be required for all verified or authorized Part 15 devices

- Special accessories that are not readily obtainable from multiple sources and that are needed to enable equipment to comply with the regulations would be required to be included with the equipment when it is marketed (this formerly applied only to computing devices)

- Devices that are operated with a peripheral(s) (external or internal accessories) would be tested for compliance using the type of peripheral with which the equipment will be marketed or operated.

Digital Devices:

- Devices with a power consumption of less than 6 nW, quartz watches and clocks, modules of quartz watches and clocks, musical greeting cards, and battery powered hand-held calculators and electronic games not requiring connection to the AC power lines would no longer be subject to the technical regulations

- Portable personal computers with a low power consumption and a low clock rate and their peripherals would be considered to be calculators

- The distinction between personal computer peripheral equipment requiring certification and subassemblies which require no testing for compliance would be defined in the regulations

- The permissive change regulations would be clarified

- Emission limits above 1000 MHz are proposed to be applied in the event that digital device clock rates exceed 108 MHz.

Other Unintentional Radiators:

- A power line conducted limit of 250 microvolts in the frequency range of 450 kHz to 30 MHz is proposed for all devices except carrier current systems operating in that frequency band

- Emission limits for receivers would be established above 1000 MHz

- The radiated emission limit for CB receivers would be relaxed

- The emission limit within the frequency range of 30 to 960 MHz is proposed to be tightened to the Class B digital device limits and the limit above 1000 MHz is proposed to be 500 uV/m at 3 meters; however, this requirement would be gradually phased-in

- Radiated limits for receivers would be measured with the antenna terminals shielded and an antenna conduction limit is proposed (unless the receiver uses a permanently attached antenna)

- The frequency range over which receivers are subject to the technical standards and equipment authorization procedures would be expanded to include the frequency bands of 901 to 935 MHz and 940 to 1000 MHz

- The conducted signal limits, except for the limit on the antenna transfer switch and emissions conducted on the power lines, for a TV interface device would be deleted

- The inclusion of video distribution systems and cable terminal devices under the same standards as applied to TV interface devices would be clarified.

Intentional Radiators:

- A power line conducted limit of 250 microvolts in the frequency range of 450 kHz to 30 MHz is proposed for all devices except carrier current systems operating in that frequency band

- With certain exceptions, antennas would be either permanently attached or use a unique coupler

- Spurious emissions would be measured to the higher of either the 10th harmonic or the range specified for unintentional radiators

- General emission limits are proposed to be established at which any form of operation is permitted on almost any frequency - these limits are equivalent to the Class B digital device limits above 30 MHz, the existing limits below 1.705 MHz, and new limits between 1.705 and 10 MHz and above 960 MHz

- Restricted bands related to safety-of-life and sensitive authorized services, *e.g.*, radio astronomy and satellite down links, are proposed within which only spurious emissions are permitted

- The existing Part 15 frequency "windows" within which higher field strength limits are permitted would be retained

- External input signals on cordless telephones would be permitted

- The requirement to use a microphone to directly modulate a transmitter in the 88 to 108 MHz band would be deleted and these transmitters would be subject to certification

- A tunnel radio system is proposed to be established to permit any form of operation within a tunnel or mine without limiting the level of emissions within that tunnel or mine

- Campus radio AM broadcast systems would be recognized

- General use, higher field strength bands without channelization or bandwidth restrictions are proposed to be established on the following frequency bands: 13.553-13.567 MHz, 26.96-27.28 MHz, 40.66-40.70 MHz, 49.82-49.90 MHz, 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz

- Specific regulations for devices that measure the characteristics of a material (except for the 890-940 MHz band) and some telemetering devices would be deleted to be replaced by the general limits, the general use, higher field strength bands, or other frequency bands designed in the item

- Comments are requested on the feasibility of applying field strength limits to the currently permitted frequency hopping and direct sequence spread spectrum systems instead of the present limit on output power

- Automated vehicle identification systems operating in the 2.9 to 4.1 GHz band would be deleted

- The existing channelized operations at 27 MHz and 49 MHz would be phased-out in favor of the general use bands, and the spurious emission limits for cordless telephones, as well as for general operation in the 27 MHz and 49 MHz bands, would be tightened over a grandfather period

- Peak emissions from periodic transmitters operating above 70 MHz, including control and security alarm devices, would be limited to 20 dB above the permitted average field strength limits.

APPENDIX B

Non-licensed Intentional Radiators - Part 15

Frequency Band/Rules (MHz)	Standards	Proposed Changes/Rules*
0.009-.490 (15.111)	2400/f(kHz) uV/m @ 300m, spurious under same formula, certification required	Spurious may not exceed the general emission limits in 15.209 (15.209)
0.16-.19 (15.112)	1 W input, 15 m ant., spurious outside of band @ -20dB, certifi- cation required	No changes (15.217)
0.49-.51 (15.7)	15 uV/m @ $\lambda/2\pi$	Operation not permitted in this band (15.205)
0.51-1.705 (15.111)	24000/f(kHz) uV/m @ 30m, spurious under same formula, certifi- cation required	Spurious may not exceed the general emission limits in 15.209 (15.209) and campus radio system added for 535-1705 kHz (15.219)
0.51-1.705 (15.113)	0.1 W input, 3m ant., spurious outside of band at -20dB, conducted in band @ 200 uV, certification required	No changes (15.219)
* Under the proposed regulations, all intentional radiators, except carrier current systems operating from 450 kHz to 30 MHz, must limit their conducted emissions to 250 uV within the frequency range of 450 kHz to 30 MHz (see proposed 15.207). Unless otherwise stated, spurious emissions must be attenuated to the limits shown in the proposed Section 15.209. In addition, the range of frequencies over which spurious and harmonic emissions are investigated is proposed to be increased for some intentional radiators (see proposed 15.33). Further, there are a number of frequency bands on which operation is not permitted (see proposed 15.205).		
1.705-10 (15.114)	15-100 uV/m @ 3m depending on bandwidth, spurious outside of band from 10-20 uV/m @ 30m depending on frequency, certification required	30-100 uV/m @ 30m depending on bandwidth, (15.223)
10-26.99 (15.7)	15 uV/m @ $\lambda/2\pi$	30 uV/m @ 30m, certification required (15.209)
13.553-13.567 (15.191- 15.194)	15 uV/m @ 30m, spurious at 0.5 uV/m @ 30m, certification required, restricted to devices that measure the charac- teristics of a material	10000 uV/m @ 30m, + 0.01% frequency tolerance, restriction deleted (15.225)
26.99-27.26 (15.116)	10000 uV/m @ 3m, 6 channels of 20 kHz bandwidth, spurious of 500 uV/m @ 3m, con- ducted below 25 MHz of 100 uV, no voice or CW, certification required	Gradually phased-out in favor of band shown below (15.227(c))

26.96-27.28 (15.191-15.194)	32 uV/m @ 30m, spurious at 1 uV/m @ 30m, certification required, restricted to devices in that measure the characteristics of a material	10000 uV/m @ 3m, spurious outside this band at general limits 15.209, restriction deleted (15.227)
27.28-30 (15.7)	15 uV/m @ $\Lambda/2\pi$	30 uV/m @ 30m, certification required (15.209)
30-41 (15.7)	15 uV/m @ $\Lambda/2\pi$	100 uV/m @ 3m, certification required (15.209)
38-41 (15.172)	10 uV/m @ 15m, 200 kHz bandwidth, spurious at 10 uV/m @ 3m, certification required, restricted to biomedical telemetry	100 uV/m @ 3m, restriction deleted (15.209)
40.66-40.70 (15.122, 15.191-15.194, 15.201-15.215, 15.310)	Ranges from 50 uV/m @ 30m with spurious at 1.5 uV/m @ 30m to 2250 uV/m @ 3m with spurious at 225 uV/m at 3m depending on application, certification required, restricted to devices that measure the characteristics of a material, perimeter protection and periodic operation	1000 uV/m @ 3m, + 0.01% frequency stability, restrictions deleted (15.229)
41-46.6 (15.7)	15 uV/m @ $\Lambda/2\pi$	100 uV/m @ 3m, certification required (15.209)
46.6-46.98 (15.231-15.237)	10000 uV/m @ 3m with spurious from 100 to 200 uV/m @ 3m depending on frequency, conducted below 30 MHz of 100 uV, certification required, restricted to cordless telephone base	External input signals permitted (15.231)
46.98-49.82 (15.7)	15 uV/m @ $\Lambda/2\pi$	100 uV/m @ 3m, certification required (15.209)
49.66-50.0 (15.231-15.237)	10000 uV/m @ 3m with spurious from 100 to 200 uV/m @ 3m depending on frequency, conducted below 30 MHz of 100 uV, certification required, restricted to cordless telephone mobile	External input signals permitted (15.231)
49.82-49.90 (15.117-15.118)	10000 uV/m @ 3m with spurious at 500 uV/m @ 3m, 5 channels of 20 kHz bandwidth, conducted below 25 MHz of 100 uV, certification required	Channelization and bandwidth limits deleted, spurious outside this band at general limits under 15.209, existing standards permitted for a grandfather period (15.233)

49.82-49.90 (15.119)	0.1 W input, 1m ant., harmonics suppressed 20 dB, restricted to home built in quantities less than 5 with no marketing	No changes (15.233)
49.90-70 (15.7)	15 uV/m @ $\Lambda/2\pi$	100 uV/m @ 3m, certification required (15.209)
70-130 (15.122)	500 uV/m @ 3m with spurious at 50 uV/m @ 3m, maximum bandwidth of 0.25% of operating frequency, conducted from .45-30 MHz of 250 uV, certification required, restricted to periodic operation of 30:1 with maximum on time of 1 second and minimum off of 10 seconds	Spurious need not be attenuated below the general limits in 15.209 (15.235(d))
70-130 (15.201- 15.215)	1250 uV/m @ 3m with spurious at 125 uV/m @ 3m, spurious of 15 uV/m @ 3m within 73-75.4, 108-118 and 121.4-121.6 MHz, maximum bandwidth of .25%, conducted from .45-30 MHz of 250 uV, certification required, restricted to control and security alarm devices	Spurious need not be attenuated below the general limits in 15.209 (15.235)
70-88 (none)	Not permitted	100 uV/m @ 3m, certification required (15.209)
72-73 and 75.4- 76 (15.331-15.337)	8000 uV/m @ 30 m with spurious at 150 uV/m @ 30m, channelized with 50 kHz and 200 kHz bandwidths, certification bandwidth permitted at required, restricted to auditory assistance to the hearing handicapped	80000 uV/m @ 3m with spurious at 1500 uV/m @ 3m, channelization deleted, 200 kHz
88-108 (15.161- 15.164, 15.174, 15.335)	50 uV/m @ 15m with spurious at 40 uV/m @ 3m, 200 kHz bandwidth, no conducted limit, type approval (15.161- 15.164, 15.174) or certification (15.335) required, restricted to wireless microphones, telemetry and auditory assistance devices	all frequencies (15.237)
88-216 (none)	Not permitted	250 uV/m @ 3m, no microphone input requirement, certification required, restrictions deleted (15.239)
		150 uV/m @ 3m, certifi- cation required (15.209)

130-174 (15.122)	500-1500 uV/m @ 3m with spurious of 50-150 uV/m @ 3m (linear interpolation), maximum bandwidth of 0.25%, conducted from .45-30 MHz of 250 uV, certification required, restricted to periodic operation of 30:1 with maximum on time of 1 second and minimum off of 10 seconds	Spurious need not be attenuated below the general limits in 15.209 (15.235(d))
130-174 (15.201-15.215)	1250-3750 uB/m @ 3m with spurious of 125-375 uV/m @ 3m (linear interpolation), spurious of 15 uV/m @ 3m from 156.7-156.9 MHz, maximum bandwidth of 0.25%, conducted from .45-30 MHz of 250 uV, certification required, restricted to control and security alarm devices	Spurious need not be attenuated below the general limits in 15.209 (15.235)
174-216 (15.176)	150 uV/m @ 30m with spurious at 15 uV/m @ 30m, 200 kHz bandwidth, certification required, restricted to biomedical telemetry	1500 uV/m @ 3m (15.241)
174-216 (15.122)	1500 uV/m @ 3m with spurious @ 150 uV/m @ 3m, maximum bandwidth of 0.25%, conducted from .45-30 MHz of 250 uV, certification required, restricted to periodic operation of 30:1 with maximum on time of 1 second and minimum off of 10 seconds	Spurious need not be attenuated below the general limits in 15.209 (15.235(d))
174-216 (15.201-15.215)	3750 uV/m @ 3m with spurious @ 375 uV/m @ 3m, maximum bandwidth of .25%, conducted from .45-30 MHz of 250 uV, certification required, restricted to control and security alarm devices	Spurious need not be attenuated below the general limits in 15.209 (15.235)
216-960 (none)	Not permitted.	200 uV/m @ 3m, certification required (15.209)

216-260 (15.122)	1500 uV/m @ 3m with spurious @ 150 uV/m @ 3m, maximum bandwidth of .25%, conducted from .45-30 MHz of 250 uV, certification required, restricted to periodic operation of 30:1 with maximum on time of 1 second and minimum off of 10 seconds	Spurious need not be attenuated below the general limits in 15.209 (15.235(d))
216-260 (15.201-15.215)	3750 uV/m @ 3m with spurious @ 375 uV/m @ 3m, spurious of 15 uV/m @ 3m in the band 240-260 MHz, maximum bandwidth of 0.25%, conducted from .45-30 MHz of 250 uV, certification required, restricted to control and security alarm devices	Spurious need not be attenuated below the general limits in 15.209 (15.235)
260-470 (15.122)	1500-5000 uV/m @ 3m with spurious of 150-500 uV/m @ 3m (linear interpolation), maximum bandwidth of 0.25%, conducted from .45-30 MHz of 250 uV, certification required, restricted to periodic operation of 30:1 with maximum on time of 1 second and minimum off of 10 seconds	Spurious need not be attenuated below the general limits in 15.209 (15.235(d))
260-470 (15.201-15.215)	3750-12500 uV/m @ 3m with spurious at 375-1250 uV/m @ 3m (linear interpolation), spurious of 15 uV/m @ 3m in the bands 260-285, 328.6-335.4, and 404-406.2 MHz, maximum bandwidth of 0.25%, conducted from .45-30 MHz of 250 uV, certification required, restricted to control and security alarm devices	Spurious need not be attenuated below the general limits in 15.209, restricted bands changed (15.235)
Above 470 (15.122)	5000 uV/m @ 3m with spurious at 500 uV/m @ 3m, maximum bandwidth of 0.25% below 900 MHz and 0.5% above 900 MHz, conducted from .45-30 MHz of 250 uV, restricted to periodic operation of 30:1 with maximum on time of 1 second and minimum off of 10 seconds	Spurious need not be attenuated below the general limits in 15.209 (15.235(d))

Above 470 (15.201-15.215)	12500 uV/m @ 3m with spurious of 1250 uV/m @ 3m, spurious in restricted bands (see 15.205) below 1000 MHz of 15 uV/m @ 3m and above 1000 MHz of 125 uV/m @ 3m, maximum bandwidth 0.25% below 900 MHz and 0.5% above 900 MHz, conducted from .45-30 MHz of 250 uV, certification required, restricted to control and security alarm devices	Spurious need not be attenuated below the general limits in 15.209, restricted bands changed (15.235)
890-940 (15.191-15.194)	500 uV/m @ 30m with harmonics at 50 uV/m @ 30m and spurious at 15 uV/m @ 30m, certification required, restricted to devices that measure the characteristics of a material	Spurious, including harmonics, may not exceed the general limits in 15.209 (15.243)
902-928 (none)	Not permitted	50 mV/m @ 3m with harmonics at 500 uV/m @ 3m and spurious outside the frequency band at -50 dB or the general limits under 15.209, certification required (15.249)
902-928 (15.126)	1 W peak output, certification required, restricted to frequency hopping and direct sequence spread spectrum systems	No changes, but comments requested on the specification of field strength limits (15.247)
902-928 (15.301-15.324)	50 mV/m @ 30m with harmonics at 160 uV/m @ 30m and spurious at -50dB or 15 uV/m @ 30m, certification required, restricted to field disturbance sensors	500 mV/m @ 3m with harmonics at 1.6 mV/m @ 3m and spurious at -50 dB or the general limits under 15.209 (15.245)
Above 960 (none)	Not permitted	500 uV/m @ 3m, certification required (15.209)
2400-2483.5 (15.126)	1 W peak output, certification required, restricted to frequency hopping and direct sequence spread spectrum systems	No changes, but comments requested on the specification of field strength limits (15.247)
2400-2500 (15.191-15.194)	0.5 mV/m @ 30m with harmonics at 50 uV/m @ 30m and spurious at 15 uV/m @ 30m, certification required, restricted to devices that measure the characteristics of a material	Deleted, may operate under the general provisions shown below

Frequency Band/Rules (GHz)	Standards Proposed	Changes/Rules
2.4-2.4835 (none)	Not permitted	50 mV/m @ 3m with harmonics at 500 uV/m @ 3m and spurious outside the band at -50 dB or the general limits under 15.209, certification required (15.249)
2.435-2.465 (15.301-15.324)	50 mV/m @ 30m with harmonics at 160 uV/m and spurious at -50dB or 15 uV/m @ 30m, certification required, restricted to field disturbance sensors	500 mV/m @ 3m with harmonics at 1.6 mV/m @ 3m and spurious outside the band at -50 dB or the general limits in 15.209 (15.245)
2.9-4.1 (15.221-15.228)	3 mV/m/MHz @ 3m with spurious of 100 uV/m/MHz @ 3m, conducted limit of 200 uV from .45-30 MHz, certification required, restricted to automatic vehicle identification system (other standards regarding sweep rate, etc. also exist)	Deleted
5.725-5.85 (15.126)	1 W peak output, certification required, restricted to frequency hopping and direct sequence spread spectrum systems	No changes, but comments requested on the specification of field strength limits (15.247)
5.725-5.875 (15.191-15.194)	0.5 mV/m @ 30m with harmonics at 50 uV/m @ 30m and spurious at 15 uV/m @ 30m, certification required, restricted to devices that measure the characteristics of a material	Deleted, may operate under the general provisions shown below
5.725-5.875 (none)	Not permitted	50 mV/m @ 3m with harmonics at 500 uV/m @ 3m and spurious outside the frequency band at -50 dB or the general limits in 15.209, certification required (15.249)
5.785-5.815 (15.301-15.324)	50 mV/m @ 30m with harmonics at 160 uV/m @ 30m and spurious at -50dB or 15 uV/m @ 30m, certification required, restricted to field disturbance sensors	500 mV/m @ 3m with harmonics at 1.6 mV/m @ 3m and spurious outside the band at -50 dB or the general limits under 15.209 (15.245)

10.5-10.55 (15.301-25.324)	250 mV/m @ 30m with harmonics at 2.5 mV/m @ 30m and spurious at -50dB or 15 uV/m @ 30m, certification required, restricted to field disturbance sensors	2500 mV/m @ 3m with harmonics at 25 mV/m @ 3m and spurious outside the band at -50 dB or the general limits under 15.209 (15.245)
24.0-24.25 (none)	Not permitted	250 mV/m @ 3m with harmonics at 2.5 mV/m @ 3m and spurious outside the frequency band at -50 dB or the general limits under 15.209, certification required (15.249)
24.0-24.25 (15.191-15.194)	500 uV/m @ 30m with harmonics at 50 uV/m @ 30m and spurious at 15 uV/m @ 30m, certification required, restricted to devices that measure the characteristics of a material	Deleted, may operate under the general provisions shown above
24.075-24.175 (15.301-15.324)	250 mV/m @ 30m with harmonics at 2.5 mV/m @ 30m and spurious at -50dB or 15 uV/m @ 30m, certification required, restricted to field disturbance sensors	2500 mV/m @ 3m with harmonics at 25 mV/m @ 3m and spurious outside the band at -50 dB or the general limits under 15.209 (15.245)

APPENDIX C Receiver Standards - Part 15

Frequency Band (MHz)	Current Standards	Proposed Changes
0.45-25	TV rcvrs. = 100 uV conducted; all other rcvrs. = 100 uV conducted for .45-9 MHz, 1000 uV conducted for 10-25 MHz, and linear increase in conducted from 100 uV to 1000 uV for 9-10 MHz	250 uV conducted for all receivers, to be phased-in
25-70	32 uV/m @ 100 ft. except for rcvrs. associated with a periodic transmitter at 40.66-40.70 MHz which are 320 uV/m @ 3m	250 uV conducted for 25-30 MHz, 100 uV/m @ 3m for 30-70 MHz, to be phased-in
70-130	50 uV/m @ 100 ft. except for rcvrs. associated with a periodic transmitter which are 500 uV/m @ 3m	100 uV/m @ 3m for 70-88 MHz, 150 uV/m @ 3m for 88-130 MHz, to be phased-in
130-174	50-150 uV/m @ 100 ft. (linear interpolation) except for rcvrs. associated with a periodic transmitter which are 500 uV/m @ 3m	150 uV/m @ 3m, to be phased-in

174-260	150 uV/m @ 100 ft. except for rcvrs. associated with a periodic transmitter which are 500 uV/m @ 3m for 174-200 MHz and 500-707.7 uV/m @ 3m for 200-260 MHz (linear interpolation)	150 uV/m @ 3m for 174-216 MHz, 200 uV/m @ 3m for 216-260 MHz, to be phased-in
260-470	150-500 uV/m @ 100 ft (linear interpolation) except for rcvrs. associated with a periodic transmitter which are 707.7-1435 uV/m @ 3m (linear interpolation)	200 uV/m @ 3m, to be phased-in
470-1000	500 uV/m @ 100 ft. except for rcvrs. associated with a periodic transmitter which are 1435-3269 uV/m @ 3m (linear interpolation) and TV broadcast rcvrs. which are 350 uV/m @ 100 ft. average with no emission exceeding 750 uV/m @ 100 ft.	200 uV/m @ 3m for 470-960 MHz, and 500 uV/m @ 3m for 960-1000 MHz, to be phased-in
1000-1500	3269-5000 uV/m @ 3m (linear interpolation) (applies only to rcvrs. associated with a periodic transmitter)	500 uV/m @ 3m for all rcvrs., to be phased-in
Above 1500	5000 uV/m @ 3m (applies only to rcvrs. associated with a periodic transmitter)	500 uV/m @ 3m for all rcvrs., to be phased-in

APPENDIX D Proposed Restricted Bands - Part 15

Frequency (MHz)	Allocation/Use
0.49-0.51	Maritime distress frequency
2.1735-2.1905	Mobile distress frequency
8.362-8.366	Maritime and aeronautical survival craft search and rescue
13.36-13.41	Radio astronomy
25.5-25.67	Radio astronomy
37.5-38.25	Radio astronomy
73.0-75.4	73-74.6 MHz: Radio astronomy 74.6-75.4 MHz: Aeronautical radionavigation marker beacon (75.0 MHz) and guard bands (note - this band is currently restricted for control and security alarm devices (CSAD))
108-121.94	108-117.975 MHz: Aeronautical radionavigation (aircraft-to-tower) (note - currently restricted for CSAD) 117.975-121.9375 MHz: Aeronautical mobile for safety and regularity of flight 121.4-121.6 MHz: Search and rescue (SARSAT) (note - currently restricted for CSAD)
123-123.2	Coordinated search and rescue by mobile, land and aeronautical
123.58-138.0	123.5875-137 MHz: Aeronautical mobile for safety and regularity of flight 137-138 MHz: Satellite down link
149.9-150.05	Radionavigation satellite down link

156.7-156.9	Search and rescue (maritime mobile distress and calling on 156.7625-156.8375 MHz) (note - currently restricted for CSAD)
164.43-164.72	Department of Interior for tracking of potentially dangerous animals
166.73-167.17	Department of Interior for telemetry operations for wildlife studies using sensitive receiving equipment
240-285	243 MHz: Search and rescue (SARSAT) Other: U. S. Government satellite down links, military satellites, glide slope indicators, instrument landing systems (note - currently restricted for CSAD)
322-335.4	322-328.6 MHz: Radio astronomy 328.6-335.4 MHz: Aeronautical radionavigation - instrument landing system glide path (note - 328.6-335.4 MHz currently restricted for CSAD)
399.9-410	399.9-400.05 MHz: Radionavigation satellite 400.05-400.15 MHz: Standard frequency and time signal 400.15-402 MHz: Satellite down link 402-406 MHz: Meteorological aids (radiosonde) 406-406.1 MHz: Emergency position-indicating radiobeacon (EPIRB) 406.1-410 MHz: Radio astronomy (note - 404-406.2 MHz currently restricted for CSAD)
608-614	Radio astronomy (note - currently restricted for CSAD)
960-1240	960-1215 MHz: Aeronautical radionavigation 1215-1240 MHz: Satellite down link (note - 960-1215 MHz currently restricted for CSAD)
1300-1427	1300-1350 MHz: Aeronautical radionavigation 1350-1400 MHz: Spectral line observations of neutral hydrogen 1400-1427 MHz: Radio astronomy (note - 1400-1427 MHz currently restricted for CSAD)
1530-1626.5	1530-1559 MHz: Satellite down link 1559-1610 MHz: Satellite down link and aeronautical radionavigation 1610-1626.5 MHz: Aeronautical radionavigation 1610.6-1613.8 MHz: Spectral line observations of OH radical (radio astronomy) (note - 1535-1660 MHz currently restricted for CSAD)
1660-1710	1660-1668.4 MHz: Radio astronomy 1668.4-1670 MHz: Radio astronomy and radiosonde 1670-1710 MHz: Satellite down link and radiosonde (note - 1660-1670 MHz currently restricted for CSAD)
2200-2300	Satellite down link
2483.5-2500	Radiodetermination satellite down link (Geostar)
2655-2900	2655-2690 MHz: Radio astronomy and satellite down link 2690-2700 MHz: Radio astronomy 2700-2900 MHz: Air traffic control radars (note - 2690-2700 MHz currently restricted for CSAD)
3260-3267	Spectral line observations (radio astronomy)
3332-3339	Spectral line observations (radio astronomy)
3345.8-3358	Spectral line observations (radio astronomy)
3600-4400	3600-4200 MHz: Satellite down link 4200-4400 MHz: Aeronautical radionavigation (note - 4200-4400 MHz currently restricted for CSAD)
4500-5250	4500-4800 MHz: Satellite down link 4800-5000 MHz: Radio astronomy 5000-5250 MHz: Aeronautical radionavigation (note - 4990-5250 MHz currently restricted for CSAD)
5350-5460	Aeronautical radionavigation
7250-7750	Satellite down link
8025-8500	Satellite down link

9000-9200	Aeronautical radionavigation
9.3-9.5	Radar transponders for maritime search and rescue; airborne weather and ground mapping radar for airborne radionavigation, particularly under poor visibility conditions
10.6-12.7	10.6-10.7 GHz: Radio astronomy 10.7-12.2 GHz: Satellite down link 12.2-12.7 GHz: Direct broadcast satellite (note - 10.68-10.7 GHz currently restricted for CSAD)
13.25-13.4	Aeronautical radionavigation
14.47-14.5	Spectral line observations (radio astronomy)
15.35-16.2	15.35-15.4 GHz: Radio astronomy 15.4-15.7 GHz: Shuttle landing system; airborne weather and ground mapping radar for radionavigation 15.7-16.2 GHz: Airport surface detection equipment used to locate and navigate aircraft while on the ground (note - 15.35-15.4 GHz currently restricted for CSAD)
17.7-21.4	Satellite down link
22.01-23.12	22.01-22.5 GHz: Radio astronomy 22.5-23.0 GHz: Broadcast satellite (22.81-22.86 GHz is also radio astronomy) 23.0-23.07 GHz: Fixed/inter-satellite/mobile (used to fill in the gap between frequency bands) 23.07-23.12 GHz: Radio astronomy
23.6-24.0	Radio astronomy
31.2-31.8	Radio astronomy (note - 31.3-31.5 GHz currently restricted for CSAD)
36.43-36.5	Radio astronomy
38.6-40.0	Satellite down link
Above 40.0	Numerous bands above 40 GHz should be restricted because of use in radio astronomy, satellite down links, etc. However, the state-of-the-art in measure- ment techniques generally limits measurement range to 40 GHz. Due to this lack of ability to perform measurements above 40 GHz and the present lack of consumer demand for operation above this frequency, operation of a Part 15 device on frequencies higher than 40 GHz is not proposed at this time.